Designing the Management Systems for Offices

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Abstract

An initial review of literature concerned with commercial and industrial office design indicated the need to research and develop a method for the design of the management systems of offices with the purpose of improving the operational effectiveness and alignment to strategy. In particular the literature review indicated that the application of lean methods, in non-manufacturing areas is comparatively rare. A critical review of the literature identified that Value Stream Mapping has been used to map mechanistic task activities, however, a need was identified for a new generation of Value Stream Mapping to map mixed mechanistic and organic task activities. To complement the literature survey and discover if there were significant variables (e.g. task uncertainty, interdependence, task complexity, mechanistic / organic structures, risk, task analysability… etc) influencing office design, pilot studies were carried out in a mechanistic and organic office. Several additional variables were identified. From the pilot studies combined with the literature review a conceptual model was formulated which provides guidelines for managers enabling them to design the management systems fully taking all the variables into account.

The conceptual model was then tested using a multiple case study design of two small consulting type offices that exhibited mixed mechanistic and organic characteristics. This resulted in an improved version of the model which was then further validated. This validation based upon the opinions of office managers focused mainly on identifying the practical usefulness of the model from an industrial perspective. Following the validation a final form of the model has been proposed in this research. It remains for future researchers to fully test the model by applying it in a wider range of offices.

This study makes an explicit contribution to the redesign of offices as well as the utilisation of Value Stream Mapping to the mechanistic and the organic task activities within commercial and industrial offices.

Keywords:

Redesign of office management systems, diagnosis of office management systems, lean offices, value stream mapping in offices, continuous improvements in offices, business process improvements for offices, mechanistic and organic tasks.

Acknowledgements

Dedication

This thesis is dedicated to the soul of my beloved mother who recently died after a long battle with cancer…

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1   *CHAPTER ONE: General Introduction*

1.1   Introduction

The context of this research is introduced in this chapter. It starts with a brief overview of the background to the research, the initial overall aim of the study as well as the justifications for this research. Thereafter, the research interests and research objectives of this study are presented. Then it is followed by a brief summary of the research methodology adopted to achieve the objectives of this research inquiry. Thereafter, the thesis structure and contents, which introduces the chapters of the thesis, are explored.

1.2   Background and Justification for Research

1.2.1   Importance of Improving Offices

I come from a Manufacturing Engineering background, which mainly focuses on shop floor and how to make it run effectively, by applying lean tools and techniques within its various areas.

Piercy and Rich (2009) argue that service businesses are currently struggling with both customer demands for better quality of service and managerial demands for cost reduction. They argue that there is evidence suggesting that service businesses are in practice failing on both these counts as they are facing increased costs along with deteriorating service quality (Piercy, Rich 2009). Thompson (1997) and Tapping and Shuker (2003) argue that manufacturing companies tend to concentrate on their competitive advantage through enhancing the manufacturing processes. At the same time they often overlook office domains as a source of a competitive advantage (Thompson 1997, Tapping, Shuker 2003). However recently the global market is becoming increasingly competitive, and for companies to compete in a large scale competitive market, they have to work hard on improving the overall business process including the office domain (Thompson 1997). In addition, Tapping and Shuker (2003) argue that sixty to eighty percent of the cost related to a product or service line is associated with non-production

processes (Tapping, Shuker 2003). These administrative non-production processes play a fundamental role in maintaining the business by ensuring that the product or the service is ordered, shipped and paid for, this makes offices a source of huge and often overlooked opportunity for improvement (Tapping, Shuker 2003).

This made me interested in applying lean tools and techniques such as Value Stream Mapping in the design of offices to make them more effective.

These findings were confirmed from an industrial perspective from two managers each operating in two large renowned manufacturing companies, who took part in this study. The manager of the business improvements section of the Excellence department of Siemens recently supported the need for this study by stating the following:

"… it took us ten years to get lean into this company… okay… we already applied a limited number of lean tools and techniques in offices, because our focus was on the manufacturing areas initially… but we applied in offices tools such 5S… and Value Stream Mapping to map certain processes… after successfully implementing lean in manufacturing areas… Now we are looking into focusing much more on offices throughout the whole company… This is why we are in the process of finding out the best ways of doing it… and the best mapping tools and techniques that can be used to improve them and make them lean…"

Source: Business Improvement Manager of Siemens on 1/7/2010, as shown in Appendix (N).

Also the manager of the Exostar team of the e-procurement department of Rolls Royce recently supported the need for this study by stating the following:

"I think that a selling point for this tool is to explain that it can help the managers understand how to make the office and organisation lean and we are all under pressure to do that… time, efficiency, savings etc… You know the lean organisation… because we are under pressure… if we look around

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this room… you will see that's what it's all about… so that's what they are talking about process improvements… and this can break it down for you that way… So the main selling point is to look at your total processes and how you can improve them…"

Source: The manager of the Exostar team of the e-procurement department of Rolls Royce on 13/9/2010, as shown in Appendix (M).

1.2.2 Overall Aim

Thompson (1997) and Tapping and Shuker (2003) argue that manufacturing companies tend to concentrate on having competitive advantage through enhancing the manufacturing processes whilst often overlooking office domains as a source of competitive advantage. This made me intrigued about offices, how they operate and how they can be improved. The initial aim of the study was to investigate how offices and their management systems can be (re)designed by their managers to increase their effectiveness and leanness. Recently, Piercy and Rich (2009) advocated that service businesses are struggling with customer demands for better quality service and managerial demands for cost reduction. They provided evidence that service businesses are in practice failing on both these counts, seeing increased costs and reductions in service quality (Piercy, Rich 2009). Also, Radnor argues that the development and application of lean tools and techniques within the service sectors (e.g. the public sector) are still under researched (Radnor 2010). This shows how latest literature and research in the area of offices confirm the need for this research.

1.2.3 Office Definition

A working definition has been created for the aim of this study, from the work of various authors on the subject (Galbraith, Downey et al. 2002, Duncan 1981, McKenna 2006). An office of an organisation has been defined in this study as a semi-autonomous accountable human group working together with some form of interdependence between them as an organisation both distinct from and a part of the company itself. Therefore, an office is possibly part of a

larger department, which may be within an even larger organisation that has individuals who work towards a common goal.

1.2.4 Research Rationale – Thinking Process

It was found that most literature related to offices focus on the physical design and ergonomics of offices. In addition, latest literature focused on the application of various lean tools and techniques within offices, which tends to focus on improving certain aspects and business processes of the office rather than a full lean implementation to the whole office (Emiliani 2007a). However, very little attention was given to identify a way to fully redesign or diagnose offices in terms of its various management systems, which is an issue that is directly related to the initial objectives of this study.

Parnaby (1995) defined a system as "An integrated combination of components designed to follow a common purpose. A systems philosophy demands that an unco-ordinated piecemeal activity is replaced by a co-ordinated approach in which the identity of the separate parts of the system is subsumed by the identity of the total system." A system in this study relates to the separate main management systems existing within offices. By adapting from Parnaby (1995)'s definition, this means that each one of these office management systems can be defined in this study as an integrated combination of components of an office designed to follow a common purpose. The design of all these separate main managerial components represents the design of the total managerial aspects of an office.

This highlighted the need to develop a tool to redesign offices and their management systems. To achieve this need, it was assumed in order to redesign an office it is essential to have knowledge and understanding in terms of two dimensions: 1) The analyst has knowledge and understanding of the office management systems, which can be used as main design components of the office. 2) The analyst has knowledge and understanding of the tools, variables and concepts, which can be used to characterise, analyse and understand offices and their management systems.

However, the review of the literature indicated that there is a lack of understanding of offices and the nature of their management systems, which was witnessed and confirmed by various authors in their recent failure to implement various lean tools and techniques in certain office parts/types (Emiliani 2007a), whilst failing to give clear explicit justifications, which likely reflects their lack of understanding and inability to analyse them. For instance, Moad argues that although value stream mapping and Kanban were the bedrock of lean techniques in shop floors, they are proving more difficult to use or less relevant in non-production processes (Moad 2008). This was considered to be another reason that indicates the need for a new generation of Value Stream Mapping, which can be used to handle any difficulties or challenges in office domains.

In summary, this shows the need for a tool that can add new dimensions to office redesign and diagnosis: 1) Ability to redesign offices, while enabling the designer to fully understand and analyse the nature of offices and their management systems, as this will ensure that a new design will be more effective. 2) Ability to use Value Stream Mapping by perhaps creating a new generation that can cope with any challenges or difficulties encountered by others, as this will help the analyst to introduce lean aspects to the office design.

On the other hand, it was assumed at the beginning of this research that there are gaps related to identifying a tool for redesigning offices to make them more effective and leaner, based on my own experience in working in offices and knowledge about lean manufacturing.

1.3   Research Interests and Research Questions

The initial aim of this study was to identify how offices can be redesigned or diagnosed to increase their effectiveness and leanness. However, after exploring the literature, little research effort has been given to identifying tools, which aim to redesign/diagnose offices by their managers to increase their effectiveness and leanness.

The research questions, which were used to guide this research project, are shown below:

RESEARCH QUESTION (1): What is the list of variables needed to characterise offices and the design of its various management systems?

RESEARCH QUESTION (2): What are the main office management systems needed to redesign an office?

RESEARCH QUESTION (3): How can an office be redesigned / diagnosed in terms of each of its main management systems with the aim of making it leaner and more effective?

RESEARCH QUESTION (4): How can organic task activities, which tend to be complex, uncertain and unanalysable, be mapped using a new version of Value Stream Mapping?

1.3.1 Research Methodology

The methodology adopted to achieve the research objectives consisted of a combination of four methods: literature review, in-depth pilot studies, building a theory in the form of a methodology of implementation, multiple case studies to test methodology of implementation & proposed new form of Value Stream Mapping and final validation. The design of the adopted research methodology is discussed in detail in chapter 6, but is briefly outlined here to provide some context.

The literature review consists of two parts: the first part aims to explore and identify various variables and tools that can help the analyst better understand offices and their management systems. The second part is related to a exploring various organisational design theories and models, which aims to identify various management systems used to guide the design components of these organisational models. The review was based on documentations extracted from journal papers, books, internet…etc. Furthermore, the literature review search was guided by two assumptions, which were directly related to the initial aim of this study: 1) An office can be considered as a small

organisation (Galbraith, Downey et al. 2002), which means that many of the variables used to characterise and analyse organisations may be adapted to understand and analyse offices. 2) It is considered that information processing exists in all office types (Tsichritzis 1986), which means that many variables used to understand and analyse information processing within organisations can be adapted to understand and analyse offices.

As a result, a series of variables as well as theoretical models were found from the literature to provide insight about understanding offices and their nature. However, an exploratory pilot study had to be carried out to test and complement the findings of the literature review, by attempting to identify further variables that are related to understanding offices and their management systems. Consequently, two in-depth pilot studies were carried out to identify any emerging themes.

The findings of pilot studies along with theoretical assumptions, which were mainly made based on causal relationships as well as cited literature, were used to propose the conceptual model of this research inquiry in the form of a methodology of implementation. In addition, a new generation of Value Stream Mapping was developed and integrated within the model to map organic task activities along with the conventional form of Value Stream Mapping, which aims to map mechanistic task activities.

Thereafter, the conceptual model was tested, refined and developed using multiple case studies as well as action research. Action Research is defined as a set of systematic procedures, where the researcher collects data to answer a particular problem and actively participate in solving the problem; this requires the research site to collaborate in setting the research activities (Ritchie, Lewis 2006). Action research strategy combines both gathering of data as well as facilitation of change (Saunders, Lewis et al. 2006). The testing phase involved the development of the research methods. It was developed from pure qualitative research in the first case study to mixed research in the second case study while populating the model. Finally, the model was further refined and developed by carrying out a final validation,

which focused on evaluating the usefulness of the model and the academic validity of the model.

1.3.2 Thesis Structure and Contents

Figure (1.1) shows the overall research process carried out to achieve the objectives of the research. The thesis consists of ten chapters for each of which a brief description is given below:

- Chapter One: General Introduction

This chapter presents an introduction to this doctoral research and illustrates its background followed by justification for research. The research aims and objectives as well as the research methodology adopted to achieve those objectives are also briefly explored within this chapter.

- Chapter Two: Literature Review – Understanding Offices & their Management Systems

This chapter reviews the literature on offices within organisations. After presenting a brief introduction of office definition, office design and the importance of offices in organisations, the rationale used to guide the search of the literature review is discussed. Then a list of variables that can be used to understand and analyse offices and their management systems are identified. The design components used within three well-known organisational design models (e.g. Viable System Model, Galbraith Star Model and McKinsey 7-S) are also presented. This chapter also explores and identifies various office characteristics, which are considered to make the implementation of the conventional form of Value Stream Mapping difficult and challenging within the office environment. The research gaps, which provided with an opportunity to define a set of revised objectives for this research, are presented. The research questions used to guide the various steps of this study are also outlined. The chapter ends with a case, which clarifies the need to carry out the pilot study phase.

- Chapter Three: Pilot Study – Exploratory experimental phase

This chapter presents the need for the pilot studies, which is mainly used to complement the findings of the literature review. There are three aims for this phase: 1) Test and complement the list of variables defined in the literature review as variables that would help the analyst in understanding and analysing offices and their management systems. 2) Empirically, identify the management systems of offices, which emerged as common organising themes that represent the management systems of an office. This chapter also discusses the methodological considerations taken and most importantly the choice of two polar or opposite case studies (i.e. an office exhibiting predominantly mechanistic characteristics and an office exhibiting predominantly organic characteristics).

Figure (1.1) illustrates the research process

	General Introduction
Chapter 1	General Introduction Research Rational Research aim and Objectives Thesis Structure and Contents

	Literature Review – Understanding offices and their management systems
Chapter 2	Review of offices, lean offices & limitations of lean in offices Review of key variables/tools used to help in understanding & analysing offices & their management systems Exploring three well-known organisational design models to identify management systems used to represent the design components of organisations

	Pilot study – Exploratory Experimental Phase
Chapter 3	Objectives of exploratory experimental phase Methodology of pilot study Pilot study one – Mechanistic office, Pilot study two – Organic office Final list of variables needed to understand offices and their management systems

	Model Building – Linking empirical findings of pilot study with theory
Chapter 4	Identify themes from pilot studies & literature review Develop a mind map of common organising themes. Identify causal relationships between main themes & variables extracted from literature Build conceptual model for redesigning offices Describe features of conceptual model, its systems & how it fulfils the initial objectives

	Planning the Model Testing & Validating Stages
Chapter 5	Plan for testing and validating the model and the criteria used for each Meaning of model testing and meaning of model validation Design of the adopted research methodology for model testing and validation Quality of research and ethical issues

	Actual Model Testing & Refinement
Chapter 6	Siemens case study, Improvement to model from Siemens case study Rolls Royce case study, Improvements to model from Rolls Royce case study Final version of the tested model

	Model Validation
Chapter 7	Issues that needs to be validated Validation from an industrial perspective – usefulness of model Validation from an academic perspective – Discussion on validity of the adopted methodology and research methods Improvements on the model and final statement of the model

	Discussion & Final Conclusions
Chapters 8 & 9	Discussion on how research objectives were achieved Contribution to Knowledge, Model value and limitations, Adopted Research limitation & recommendations for future research

- Chapter Four: Model Building – Linking empirical findings of pilot study with theory

This chapter focuses on the process of building the conceptual model of this study. The model is built based on the management systems of offices as well as the list of variables, which provide understanding about offices and their management systems. In addition, it considers various theoretical assumptions and causal relationships based on cited literature. A description of the features of the conceptual model and its various components is also presented.

- Chapter Five: Planning the Model Testing and Validation Stages

This chapter presents the plan needed to test and validate the conceptual model of this study. It starts by defining what is meant by testing the model as well as the criteria used to test the model. Similarly, the meaning of validation is presented along with the criteria used to validate the model in terms of two perspectives (i.e. industrial and academic). It highlights the methodological considerations and presents the adopted research methodology for these two stages. The design of the research methodology, which was used to test the model using a multiple case study design and action research, is presented. The design of the research methodology, which was used to validate the model using qualitative research, is also presented. It also discusses the quality of the research and how four tests were employed to enhance the validity of this research. Thereafter, it explores various ethical issues related to research projects.

- Chapter Six: Actual Model Testing & Refinement

This chapter presents the actual testing and refinement of the model using multiple case studies. Two in-depth case studies are explored. The results are presented in tabular format. Moreover, the improvements and modifications to the new model are presented at the end of each case study.

- Chapter Seven: Model Validation

This chapter presents the final validation of the model using the same case studies. This validation was carried out qualitatively by talking to the manager of each case study that was provided during model testing. The aim was to evaluate the industrial usefulness of the model as well as its novelty from an industrial perspective. In addition, a theoretical validation was carried out by discussing the validity of the methodological consideration taken to develop the model and achieve the objectives of this research inquiry. Furthermore, limitations and improvements and modifications to the model are identified after carrying out each case study. At the end, a final statement of the model is presented.

- Chapter Eight: Discussion

This chapter presents a discussion of the whole research project. It discusses how the research objectives were achieved, the reasons for developing the model, and why the developed model was the only way to achieve the objectives. It also discusses the value of the model and states the contribution to knowledge. This is followed by a general discussion about the strengths and weaknesses of the model, as well as the strengths and weaknesses of the methodology used in this research inquiry. Thereafter, recommendations for future research are also presented on the light of the limitations of the model and the adopted methodology in this research inquiry.

- Chapter Nine: Final Conclusions

This chapter presents the aims of this research inquiry and how they were achieved. Then it presents the answers of the research questions, which guided the whole research project. It also restates the contribution to knowledge. In addition, a summary of the general research limitation & recommendations for future research are presented.

2 *CHAPTER TWO: Literature Review – Understanding Offices and their Management Systems*

2.1 Introduction

This chapter starts by stating the initial aim of this study, followed by presenting the rationale, which was used to search the literature. This literature review aims to identify various variables and tools, which can help the analyst to better understand and analyse offices and their management systems. This involves an exploration of office management systems, which can be used to represent the design process of offices. In addition, this review aims to investigate the limitations of lean tools and techniques such as Value Stream Mapping in office domains. At the end, the research gaps were identified and the revised research objectives and research questions were formulated. Identifying those revised objectives, urging the need to carry out a pilot study, which aims to test and refine the literature review findings, as shown in Chapter 3 and 4.

2.2 Initial Objective

The initial objective of the study was to investigate how offices and their management systems can be (re)designed by their managers to increase their effectiveness and leanness.

2.3 Literature Search Rationale

An initial review of the literature showed that most literature related to offices focused on the physical design and the ergonomics of offices (Haynes 2008, Steen, Blombergsson et al. 2005, Greco 1999, Stallworth Jr, Kleiner 1996, Häkkinen, Nuutinen 2007, Oseland 2009). This might be due to the fact that senior managers of offices focus on the physical aspects of the office and give little attention to the wider change-management issues (Turner, Myerson 1998). In addition much of the literature on office design was focused on the application of various lean tools and techniques within defined business processes of the office rather than a full implementation to the whole office

(Emiliani 2007a). However, very little attention was given to identify a way to fully redesign or diagnose offices in terms of its various management systems, which is an issue that is directly related to the initial objectives of this study. This highlighted the need to develop a tool to redesign offices and their management systems. To achieve this need, it was assumed that in order to redesign an office it is essential to have knowledge and understanding in terms of two dimensions: 1) The analyst has knowledge and understanding of the office management systems, which can be used as the main design components of the office. 2) The analyst has knowledge and understanding of the tools, variables and concepts, which can be used to characterise, analyse and understand offices and their management systems.

Two assumptions were made to guide the literature review search: 1) An office can be considered as a small organisation (Galbraith, Downey et al. 2002), which means that many of the systems and variables used to characterise and analyse organisations may be adapted to understand and analyse offices. 2) It is considered that information processing exists in all office types (Tsichritzis 1986), which means that many variables used to understand and analyse information processing within organisations are also applicable to analyse offices.

This instigated the idea of investigating variables related to characterising and understanding organisations, organisational design and information processing within organisations. It is however worthwhile to note that most variables identified from information processing literature were commonly used to describe organisations within areas such as organisational theory and design, organisational behaviour and organisational dynamics etc., therefore all the variables identified from these areas are presented together in section 2.8. As a result various variables were identified from various areas of literature, because they were considered to provide insights and understanding of offices and the design or diagnosis of their management systems.

On the other hand, the initial aim of this study is also concerned with redesigning offices to increase their leanness. Consequently, the application of lean tools and techniques, in particular Value Stream Mapping, is considered to provide office design with an opportunity to increase office leanness by adding a continuous improvement dimension to it. Consequently, this review will attempt to identify ways to fully incorporate Value Stream Mapping within a methodology for redesigning offices. However, there have been many challenges in applying value stream mapping in office domains, because it has been utilised in certain office parts/types and not others (Moad 2008, Emiliani 2007b). This instigated the idea of investigating the reasons behind this inapplicability using tools and variables that can help in the better understanding and analysis of offices. Consequently, the nature of the offices where value stream mapping have been successfully applied is going to be investigated. On the contrary, the nature of the types or parts of the office, where the application of Value Stream Mapping encountered difficulties will also be identified.

2.4   Literature Review Methodology

This Literature survey was performed using a systematic top-down approach, wherein a broad category is sub-divided into its particular areas, where each one of those areas aimed to provide insight to the objectives of this study. This literature review is presented in terms of various subjects that are directly related to the aims of this study. The first area of this literature survey investigates how offices are (re)designed and improved by reviewing literature related to office design and lean offices. Then this literature survey reviews management systems used to represent the components needed to redesign organisations utilising three various organisational design models (e.g. Viable System Model VSM, McKinsey 7-S and Galbraith Star Model). In addition, it reviews how offices are understood and analysed by reviewing literature related to organisational theory and design, organisational behaviour, organisational dynamics etc.

Since, this research project is interdisciplinary (i.e. lean philosophy and business studies). A summary of the various issues of importance, which were investigated, is shown in Table (2.1).

Table (2.1) illustrates the issues and topics of importance for this study.

Office definition
Diagnosing/redesigning offices
Importance of offices
Office effectiveness and management
Understanding offices
Main components/themes that represent an office
Lean Manufacture
Value stream mapping in offices
Value Stream Mapping
Limitations of lean & value stream mapping in offices
Lean offices
Information processing theory & systems
Organisational theory & design
Organisational design models
Organisational psychology
Organisational dynamics
Organisational behaviour

The strategy used to search for the literature adopted three different routes. The first two routes were conducted individually using their corresponding keywords and third route was conducted by searching through a combination of terms from both routes – by crossing between the two searches using the 'And' function.

Furthermore, an attempt was made to identify different terms used to describe a particular topic. For example, the various names used to describe management control systems (Chenhall 2003) such as formal controls (Robey, Sales 1994), and performance appraisals (Chenhall 2003) were considered while searching for this topic. Indeed, all possible terms, American and English spellings, abbreviations, and misspellings were identified, for as many variables as possible, to maximise the possible identification of the usage of terms within different articles and journals. Then, the function 'Or' was used within the search, so that all terminologies that mean and indicate the same thing were explored. For instance there were around 900 articles searched for the keyword 'Lean Office' within the database of Emerald, of

which most is irrelevant to this field of study. Furthermore, searching for the keyword 'Office Design' resulted in 15800 articles. A more defined search needed to be conducted which was obtained by introducing an 'and' function. For example, for the two broad terms 'Lean Office' and 'Office Design' there were 800 articles and this in return resulted in a reduction of the results, nevertheless the results were still considered broad and a lot of it was irrelevant to this field of study.

In order to keep track of the current and up to date literature in the area of offices and how to redesign them, the knowledge gaps were identified together with limitations within existing tools and techniques used. In total, journal papers from online e-journals such as Science direct, Emerald, Sage and Wiley InterScience were used. In addition, Loughborough University MetaLib, internet, online search engines such as Google, Google Scholar, Wikipedia, conference material, companies etc were also used. Furthermore, books, hard copies of journal papers and theses from libraries (such as British Library, Loughborough University Library) were also used. It is also worthwhile to state that both UK and USA spellings were considered whilst searching for literature.

It is worthwhile to note that the mechanism, which was used to determine the volume of literature to be searched and explored, was driven by the findings of each part of the literature review. The verification and search for various tools, variables and models, which can be used to help managers better understand/analyse offices, was considered to be adequate when investigating more literature did not seem to change or add any new variables (i.e. it rather came up with duplicated results and findings). This was the indicator, which was used to stop the search for more articles. However, as the research was progressing, two mechanisms were also used to keep the literature up to date: 1) Using Alerts of various data bases such as Zetoc, ScienceDirect etc. 2) Regularly checking for new work, publications, books etc using different combinations of keywords.

2.5   <u>Offices in Organisations</u>

Offices are the focus of this study, consequently, a working definition of offices and office design had to be formulated for the purpose of this study.

2.5.1 <u>Office Definition</u>

Beaumont defined an office as a system functioning within an organisation and it is possible to identify and explain its vital characteristics in terms of information handling activities, which contains creating information, processing information, storing information, communicating information and retrieving information (Beaumont 1990). Beaumont's definition focuses on aspects of the office related to information processing and automation. This indicated a need to formulate a more general working definition of offices. This general perspective was derived from the definition of an organisation by various authors on the subject including Galbraith, Downey et al. (2002), Duncan (1981) and McKenna (2006).

First, Galbraith, Downey et al. (2002) defined an organisation as a whole corporation or just one part of it, it can consist of tens of thousands of employees or just a few dozen. For instance, an organisation from a CEO or equivalent perspective is the entire business, however, an organisation from a division director or head of a function is the part of the business that he/she has authority to change or impact (Galbraith, Downey et al. 2002). Consequently, organisations are nested inside one another, for example a unit of ten people within a large firm is an organisation both distinct from and part of the firm itself (Galbraith, Downey et al. 2002). This definition strongly suggests that an office may be treated as an organisation nested within a larger organisation.

Second, Duncan defined an organisation as "a collection of individuals who are organised into groups and subgroups and interact with each other in an interdependent relationship, the individuals work towards common goals which are not always clear and the way they relate is determined by the structure of the organisation" (Duncan 1981, McKenna 2006). Duncan's (1981) definition somehow agrees with Galbraith, Downey et al.'s (2002)

definition mentioned earlier, because he related to Galbraith's nested units by describing groups and subgroups of the organisation. However, Duncan (1981) stresses in his definition the importance of other organisational characteristics such as structure, interdependence and the pursuit of common goals (McKenna 2006).

Consequently, the formulated definition of offices used in this research considers organisational characteristics, which were stressed by Galbraith, Downey et al. (2002) and Duncan (1981). For instance, the concept of viewing a firm as organisations or units nested inside one another (Galbraith, Downey et al. 2002) or viewing them as an organisation of groups or subgroups (Duncan 1981) have been used to formulate a working definition of an office. In addition, other organisational characteristics such as interdependence, structure and pursuit of common goals stressed by Duncan (1981) are also going to be used to formulate a working definition of offices. Consequently, an office of an organisation has been defined in this study as a semi-autonomous accountable human group working together with some form of interdependence between members of the organisation. Consequently, an office is possibly part of a larger department that may be within a larger organisation, which has individuals structured to work towards the pursuit of a common goal.

2.5.2 Office Design

The review of the literature suggested that the term office design has been predominantly used to refer to the physical design of offices as well as their ergonomics. However, the scope in this study is the redesign of offices with special attention to managerial systems. Consequently, the term 'office design' in this study relates mainly to the design of the management systems of offices needed to allow the achievements of the goals of its individuals, while considering the physical aspects of the office related to increasing office effectiveness and leanness.

2.5.3 Why Offices!

Piercy and Rich (2009) argue that service businesses are currently struggling with both customer demands for better quality service and managerial demands for cost reduction. They argue that there is evidence suggesting that service businesses are in practice failing on both these counts as they are facing increased costs along with deteriorating service quality (Piercy, Rich 2009). Thompson (1997) and Tapping and Shuker (2003) argue that manufacturing companies tend to concentrate on their competitive advantage through enhancing the manufacturing processes. At the same time they often overlook office domains as a source of a competitive advantage (Thompson 1997, Tapping, Shuker 2003). However recently the global market is becoming increasingly competitive, and for companies to compete in a large scale competitive market, they have to work hard on improving the overall business processes including the office domain (Thompson 1997). In addition, Tapping and Shuker (2003) argue that sixty to eighty percent of the cost related to a product or service line is associated with non-production processes (Tapping, Shuker 2003). These administrative non-production processes play a fundamental role in maintaining the business by ensuring that the product or the service is ordered, shipped and paid for, this makes offices a source of huge and often overlooked opportunity for improvement (Tapping, Shuker 2003).

2.5.4 Lean Offices

Lean management systems are regarded as organisational change techniques (Mullins 2007), and it has two fundamental principles. The first is continuous improvement, which is carried out using various lean tools and techniques to improve the productivity. The second is respect for people, which embodies leadership behaviours and business practices that have to be congruent with efforts to eliminate waste and add value for end-use customers (Emiliani 2007b).

Waste in Lean Production is anything that doesn't add value to the product or service, in other words it is something that is of no value to the customer and

the customer has to pay for it. Yet, waste elimination has been focused on the shop floor primarily in the manufacturing processes whilst the office was forgotten (Thompson 2000). Office waste is regarded to be a toxic waste and it results in a poisonous environment, because it increases the cost, reduces the quality of the products and services and results in benefiting from the "opportunity cost" when wasteful processes are eliminated and substituted with value-added activities (Thompson 2000). It may eliminate the root cause of many problems, because it is often hidden, in addition, it increases the stress level (Thompson 2000).

Keyte and Locher (2004) identified office waste as waste that adds cost to the business and no value to customers. They defined eight deadly wastes in an office. Most of these office wastes were found to be relevant to this study. These are shown in Table (2.2). however, some of the wastes such as 'unnecessary cost accounting' or 'engineering change orders' are not perceived as waste in this study, therefore, they have been excluded from Keyte and, Locher's (2004) list. For instance it is considered impractical to judge whether a particular cost accounting for a certain project is unnecessary or not.

Table (2.2) illustrates office waste categories and examples of them.

Waste Category	Office Examples
Overproduction: producing more, sooner or faster than required by next operation	Doing any activity (e.g. printing papers, purchasing items, processing paper work… etc), which is not needed to be processed, before the next operation needs it.
Inventory: any form of batch processing	Office supplies, sales literature, filled boxes (electronic and paper), batch processing transaction and reports.
Extra Processing	Extra copies, re-entering data, unnecessary or extra reports
Waiting	Information from customers, system response time, system downtime, approvals from others
Correction: any form of defects	Design errors, order entry errors, invoice errors
Transportation: movement of paper processing	Multiple approvals
Underutilised people: People's ability and not their time	Management command and control, Limited employee authority and responsibility for basic tasks, inadequate business tools available
Excess Motion	Walking from or to central filing, copier, fax machine, other offices

Source: (Keyte, Locher 2004).

2.5.5 Why Lean Tools and Techniques in this Research

Various authors on the subject including Piercy and Rich (2009), Thompson (1997), Tapping and Shuker (2003), Keyte and Locher (2004), Tischler (2006), Huls (2005) and Duggan (2007) advocate the use of lean techniques and tools in office domains. Keyte and Locher (2004) argue that when lean initiatives are applied to shop floors only, the organisation's opportunity for increasing productivity is limited to 35 to 40 percent over 3 to 5 years. However, when lean principles are applied to shop floor and non-production areas (i.e. administrative and office processes), 400 percent improvements in productivity should be the focus over 10 years, as companies tend to ignore incorporating lean in non-production areas (Keyte, Locher 2004). As a result, lean office production can make a business more competitive, and likely to survive with better job employment odds and job satisfaction (Thompson 1997, Tapping, Shuker 2003). It also provides a potential for tremendous improvements and job satisfaction in the office (Thompson 1997, Tapping, Shuker 2003), furthermore, it pursues waste elimination and encourages workers to become more actively involved with how the work is carried out (Tapping, Shuker 2003).

In fact, Piercy and Rich (2009) argue that the application of lean tools and techniques to pure service firms has been utilised as a means to resolve the problems that service businesses are currently facing, including reducing costs and improving quality. They argue that the application of lean approaches in the pure service environment remains largely untested (Piercy, Rich 2009). Therefore, they followed the implementation of a common programme of lean transformation in three financial service companies in the UK. They also recorded the improvements observed in each company, which in return proposed significant improvements in quality and cost positions with minimal investment (Piercy, Rich 2009). As a result, they proposed the suitability of basic lean methodologies such as process mapping, value understanding and problem solving for the pure service domain context such as financial institutions (Piercy, Rich 2009). However, the implementation of a full lean strategy within offices has been failing (Emiliani 2007a). This failure

might be due to the fact that certain lean techniques such as value stream mapping are proven more difficult or less relevant in non-production areas (Moad 2008). The failure in implementing a full lean strategy within the office has been considered as an opportunity to develop a tool for office design that can be used with the aim of improving the overall organisational design of offices. This was concluded to be an opportunity for proposing the first research gap which resulted from this literature review as shown in section 2.10.1.

2.6   Organisations and their Design

This part of the literature aims to present the need for organisational design models in this study. The models considered particularly appropriate for this research were three models: the Viable System Model VSM, the McKinsey 7-S and the Galbraith Star Model. A brief description of each of the three organisational design models is presented.

2.6.1   The Need for Organisational Design Models in this Study

As mentioned earlier in the literature search rationale in section 2.3, in order to redesign an office it is assumed to be essential to have knowledge and understanding in terms of two dimensions: 1) Knowledge and understanding of the office management systems, which can be used as the main design components of the office. 2) Knowledge and understanding of the tools, variables and concepts, which can be used to analyse and understand offices and their management systems.

2.6.1.1.   How these Organisational Design Models are used in this Research

Office management systems are going to be identified mainly from the findings of the pilot studies, as will be shown in Chapter 4. This identification is carried out by grouping all the basic themes into organising themes, which are regarded to be the office management systems. The management systems of these three organisational design models are going to be utilised in this research for two purposes:

1. The grouping of the basic themes, which emerge from the pilot study findings, into seven office management systems (for more details see section 4.2.11) including insights from the three well-known organisational design models and the management systems used within them.

2. The office management systems that emerge from the pilot study findings are going to be compared with the management systems used in each of the three organisational design models as shown in section 4.4.

The complementary views in terms of each one of the organisational design model are discussed below:

2.6.1.2. Why Viable System Model

The five constituent systems, which form a part of the VSM, were useful as a check of the subsystems of the office to determine if they were present and if they were operating effectively. VSM has been chosen for this purpose for the following two reasons: A) It is a well-known tool that has been successfully applied within numerous private and public sector organisations (Espejo, Gill 2002, Thietart 2001). B) It is a conceptual tool for understanding organisations, diagnosing or redesigning them where appropriate and support the management of change (Espejo, Gill 2002, Thietart 2001, Adams, Haynes 2007). VSM was considered to provide a complementary view to the office in terms of:

1) The recursive nature for viewing organisations and their various departments, divisions and offices (Beer 1985). For instance an organisation may consist of different departments of which each department is seen as a viable system, similarly a department may consist of different offices; each office is also seen as a viable system (Beer 1979). Since these systems at any level are by definition autonomous and contain the capacity to adapt to environmental changes and deal with their relevant complexity (Espejo, Gill 2002). This illustrates how this model is suitable for offices, because offices are viewed in this study as subsystems of a complete business system.

2) VSM helps in achieving viability at minimum cost. This is achieved both in the long and short term (Espejo, Gill 2002).

2.6.1.3. Why Galbraith Star Model

The five constituent systems which form part of the Galbraith Star Model were useful as a check of the subsystems of the office to determine if they were present. Galbraith Star Model was considered to provide the office with a complementary view to that provided by the VSM. These complementary views were:

1) This tool can be used by either a person who leads an organisation or a person who wishes to ensure that his unit is aligned to achieve its business strategy (e.g. division line, business line or midlevel manager responsible for a location, product or functional area) (Galbraith, Downey et al. 2002). Since the aim of this study is to design offices by their managers, this makes this model provide a complementary view to that provided by the VSM.

2) The Star Model considers a participative approach by involving people in the organisation beyond the executive team during the design process (Galbraith, Downey et al. 2002). This is also considered to be a complementary view to that provided by the VSM, because the aim of this study is to redesign offices using Value Stream Mapping. Value Stream Mapping is a tool that requires a participative approach of the employees involved in the office (Keyte, Locher 2004).

3) Due to its applicability in offices, as Galbraith, Downey et al. (2002) consider that organisations are nested in one another, where an office is a unit of people within a large firm. In other words, the office is an organisation both distinct from and part of the firm (i.e. bigger organisation) itself (Galbraith, Downey et al. 2002). This view is congruent with the recursive nature of the VSM and makes this model more applicable to office design.

2.6.1.4. Why McKinsey 7-S

The seven constituent systems which form a part of the McKinsey 7-S Model (Waterman, Peters et al. 1980, Barnea 2008) were useful as a check of the subsystems of the office to determine if they were present. The McKinsey 7-S Model was considered to provide the office with a complementary view to that provided by both the VSM and the Galbraith Star Model. This complementary view is related to the fact that McKinsey 7-S has been practically tested and implemented in many firms during consulting work, which asserts that it seems to work (Waterman, Peters et al. 1980). The consultants who developed the model worked for McKinsey and Company. Consequently, this model complements the other models in the fact that it was derived from a pure practical perspective.

2.6.2 <u>Description of the Organisational Design Models of Interest</u>

2.6.2.1. Viable System Model

The Viable System Model VSM was developed by Stafford Beer over twenty years ago (Espejo, Gill 2002). It is extensively used as a conceptual tool for understanding organisations, redesigning them (where suitable) and supporting the management of change (Espejo, Gill 2002).

It is based on the cybernetic principles of communication and control in complex organisations. These principles give a way of providing true autonomy and empowerment within an integrated framework (Espejo, Gill 2002).

The Viable System Model encapsulated the cybernetic theory of organisations, this theory notes that the viable system is recursive in nature (Beer 1972). It also shows how the viable systems contain viable systems, which can be modelled by utilising an identical cybernetic description as the higher & lower level systems in the containment hierarchy (Beer 1972).

An autonomous unit or viable system needs to have five key systems to be able to effectively operate in its environment (Espejo, Gill 2002), as shown in

Figure (2.1). It is worthwhile to note that these systems were named differently by various VSM researchers. For instance, Beer (1985) called them System 1 (Operations), System Two (Anti-oscillatory Device for system one), System Three (inside and now), System Four (Outside and future) and System Five (Policy). On the other hand, Espejo and Gill (2002) called the systems as System one (Implementation), System Two (Co-ordination), System Three (Control), System Four (Intelligence) and System Five (Policy).

Figure (2.1) illustrates the Viable System Model.
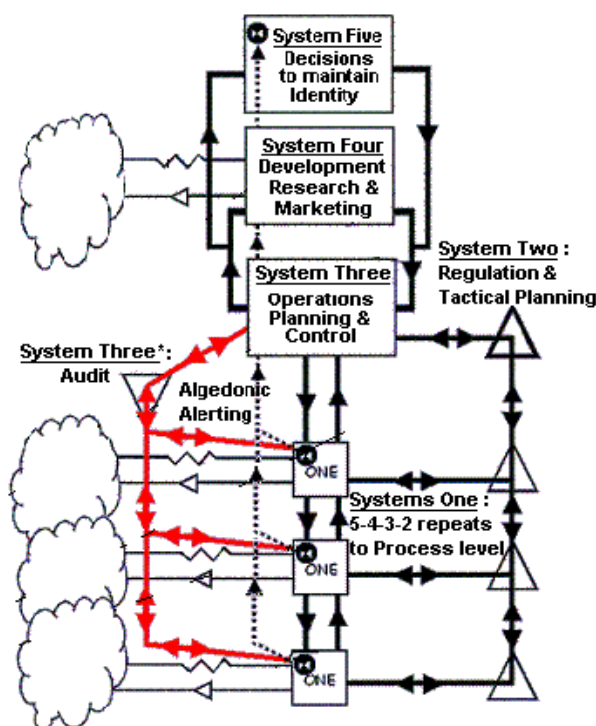
Source: (Beer 1985).

2.6.2.2. McKinsey 7-S

The McKinsey 7-S model was created in 1980 by Tom Peters and Robert Waterman, who were two consultants in McKinsey and Company (Barnea 2008). This model persisted in demonstrating its usefulness by analysing how well the organisation is positioned to accomplish its planned objectives (Barnea 2008).

The basic idea of the model is that there are seven internal elements or aspects of an organisation, as shown in Figure (2.2) (Barnea 2008). The seven elements are categorised as 'hard' or 'soft' (Barnea 2008). Hard elements are concrete and easy to define (Barnea 2008), whereas soft elements have significant influence on the hard elements and are more difficult to define. This is due to their higher variability as the capabilities, values, and elements of the corporate culture change and develop continuously (Barnea 2008). The hard elements contain strategy, structure and systems whereas the soft elements contain shared values, skills, style, and staff (Peters, Waterman 1982). Successful organisations think of both elements with equal importance however, Peters, Waterman (1982) state that most successful firms work hard on the soft S's.

Figure (2.2) illustrates the 7-S Model as well as its soft and hard elements.

Source: (Waterman, Peters et al. 1980).

If an organisation wishes to perform well, then these seven elements are required to be considered and equally reinforced. This model can also be considered to understand the interrelation between these organisational elements during the application of new initiatives to the organisation including restructuring, new processes, organisational merger, change of leadership and new systems (Waterman, Peters et al. 1980). In addition, this model can be used to analyse the current situation and plan future situations (Waterman, Peters et al. 1980).

2.6.2.3. Galbraith Star Model

The Star Model was created by Galbraith, Downey et al. (2002) to be used as a hands-on guide for leaders in all levels. They defined organisation design as the intentional process of configuring structures, reward systems, processes and people practices and policies to create an effective organisation, which can achieve its business strategy (Galbraith, Downey et al. 2002). The star model is a framework for thinking holistically about the five main components of organisation design, as shown in Figure (2.3) (Galbraith, Downey et al. 2002, Galbraith 1995).

Figure (2.3) illustrates Galbraith star model & how its major components of organisation design are interlinked.
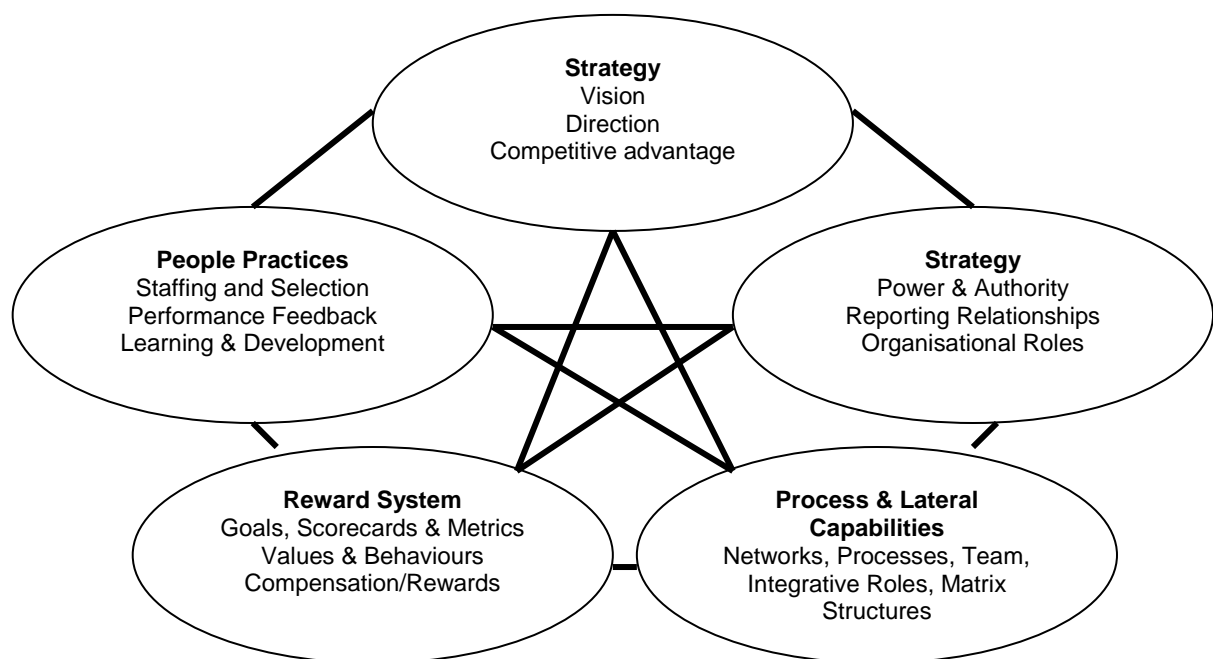
Source: (Galbraith 1995).

Galbraith, Downey et al. (2002) argued that in order for an organisation to be most effective, its five components shown in the model have to be in alignment without any of them being overlooked within the office design process, in other words, when the processes, structure, people practices and rewards all support the strategy.

2.7   Researchers in the Topic of Offices and Organisations

The motives behind reviewing certain topics in this literature review were discussed earlier in this chapter. This section presents various authors whose work was found to provide insight in relation to the aims of this research project.

Lean management systems are regarded as organisational change techniques (Mullins 2007). The work of Piercy and Rich (2009), Mullins (2007), Thompson (1997), Tapping and Shuker (2003), Emiliani (2007b), Keyte and Locher (2004), Tischler (2006), Huls (2005) and Duggan (2007) have been reviewed with the aim of exploring how various lean tools and techniques have been implemented in offices, particularly Value Stream Mapping. In addition, the limitations of Value Stream Mapping in office domains were reviewed by investigating the work of Emiliani (2007a) and Moad (2008) and critiquing case studies implemented by Tapping and Shuker (2003) and Keyte, Locher (2004) to apply Value Stream Mapping in office domains.

As mentioned earlier, it was considered in this study in order to redesign an office, the designer must be able to understand and analyse it. An office can also be considered as a small organisation (Galbraith, Downey et al. 2002). Consequently, an attempt was made to identify office systems, tools and techniques, which can be used to understand offices.

Consequently, the work of Beer (1985) on the Viable System Model, the work of Galbraith, Downey et al. (2002) on the Galbraith Star Model and the work of Waterman, Peters et al. (1980) on the McKinsey 7-S Model was reviewed to explore various management systems used as components for the design process of organisations.

As far as identifying tools and variables related to understanding offices is concerned, the work of Miller and Friesen (1984) was reviewed. The significance of their work to the aim of this study was shown, by reviewing how they characterised organisations in a detailed and thorough way by

selecting a broad variety of environmental, structural and strategy-making variables (Miller, Friesen 1984). It was considered that most of these variables can be used to characterise offices. Miller and Friesen defined 32 variables in terms of representative components (Miller, Friesen 1984). These variables are shown below:

1. External environment: The external environment of a firm was described in terms of various variables and how they pose challenges for organisations, these include dynamism, heterogeneity and hostility.

2. Structural and information processing apparatus: It is an apparatus that the firm evolves to meet the challenges of the external environment by adapting to the environment and implementing strategies. This apparatus has been described in terms of various significant variables. For instance the structure of the firm was characterised by variables such as centralisation, technocrats, resource availability, differentiation and integration etc. However, the information processing was described in terms of variables such as environmental scanning, management controls, team spirit, internal communication system etc.

3. Strategies and strategy making: It relates to the behavioural repertoire manifested by the strategies and strategy making, which help companies to cope with their external environment along with the structural and information processing apparatus (Miller, Friesen 1984). These are described in terms of adopted degree of product-market innovation, degree of risk taking, level of proactiveness of decisions (e.g. if the organisation is attempting to lead or follow competitors), degree of planning and analysis in supporting major decisions and the level to develop an explicit and integrated strategy (Miller, Friesen 1984).

Many organisational theorists stressed the significance of uncertainty in understanding the interaction with the environment (Dill 1958, Duncan 1972, Galbraith 1973, Burns, Stalker 1961, Lawrence, Lorsch 1967, Thompson 1967).

In addition, Robey (1991) and Robey and Sales (1994) advocated the importance of task uncertainty in designing organisations, they viewed uncertainty in terms of tasks (i.e. task operation uncertainty) and environment (i.e. input and output environmental uncertainty). Other authors including Duncan (1972), Huber, O'Connell et al. (1975), Gerloff, Muir et al. (1991), Berrio (2003) and Schmidt and Cummings (2007) focused on the perceived environmental uncertainty. For instance, Milliken (1987) advocates that studying the source of uncertainty identifies the domain that the decision maker is uncertain about, he, therefore, developed a new view for understanding perceived task uncertainty in terms of three types (e.g. state, effect and response). Since uncertainty encompasses many forms, various authors focused on various components. For instance, Perrow (1967) studied task operation uncertainty. However, McKenna (2006) and Dill (1958) discussed input environmental uncertainty. Also McKenna (2006), Miller and Friesen (1984), Duncan (1972), Thompson (1967), Dess and Beard (1984), Kreiser and Marino (2002) and Huczynski and Buchanan (2007) studied aspects of output environmental uncertainty related to dynamism.

Thompson (1967) was mainly interested in describing the characteristics of the technology used within organisations in terms of task interdependence, which results from the relationships between various types of technologies. He classified technologies into three different types and argues that those types of technologies create various types of task interdependence between individuals, groups, departments and organisations (Thompson 1967). He also advocates that these types of technologies also define the suitable types of coordination required to define the needed structure (Thompson 1967). In addition, Perrow (1971) was mainly interested in the effect of technology used within organisations on the organisation structure, by focusing on two dimensions, such as task variety and task analysability. As a result four types of technologies are evident (Perrow 1971).

Furthermore, Thompson's (1967) concept of interdependence was elaborated and further refined by Malone, Crowston et al. (1999), who realised that Thompson's (1967) concept describes the relationship between organisational

units. Their typology of dependencies is based on the pattern of use of common resources that creates the dependency, unlike Thompson's (1967) three categories, which is based on the topology of the relationship between the actors (Malone, Crowston et al. 1999). They showed how the concept can be extended and applied between activities in a process, not between departments per se. Consequently, they extended Thompson's (1967) work by identifying a much finer grained set of dependencies and a much richer set of coordination mechanisms for managing them (Malone, Crowston et al. 1999).

Burns and Stalker (1961) investigated various organisations to examine the relationship between the management systems and the organisational tasks, by focusing on how these management systems adapt to changes in commercial and technical tasks of the organisation. They argued that firms and their organisational units are located somewhere between two organisational structures (i.e. mechanistic and organic), which are at opposite ends of a continuum (Burns, Stalker 1961).

Lawrence and Lorsch (1967) built on the work of Burns and Stalker (1961) by developing the concept of differentiation and integration to describe organisations. The concept of differentiation views organisations by breaking them into subunits, where each one of them focuses on a specific part of the firm's environment (Lawrence, Lorsch 1967). However, integration is equivalent to coordination as it relates to the process of achieving unity of effort between the differentiated subunits of the organisation to complete the organisational tasks (Lawrence, Lorsch 1967).

The work of Magnusen, presented by Robey (1991) and Mullins (2007), expanded on the work of Burns and Stalker (1961) by viewing organisational units in a realistic way.

On the other hand, Mischel (1977) studied environments (e.g. class room of a school), stimuli (e.g. red traffic light) or treatment (e.g. experimental and clinical contexts) in terms of situations, and he classified situations into weak or strong.

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Mischel's (1977) work has a cultural influence and can be combined with the work of Quinn and Rohrbaugh (1983) and Cameron and Quinn (1999) concerning the development of the Competing Values Framework. It is a robust model used to understand a wide of variety of organisational and individual phenomena including theories of organisational effectiveness, leadership competences and roles, organisational culture, financial strategy, organisational design, information processing and organisational quality.

The work of Hersey and Blanchard on the situational leadership model can be used by managers to determine the most effective leadership style for influencing their followers (Hersey, Blanchard 1998, Hersey, Blanchard et al. 2008).

Although some of the tools, the techniques and the models which have been reviewed in this research inquiry were extracted from the work of early researchers (Robey 1991, Robey, Sales 1994, Miller, Friesen 1984, Burns, Stalker 1961, Lawrence, Lorsch 1967, Thompson 1967, Perrow 1971, Malone, Crowston et al. 1999, Malone, Crowston 1994), all of them received a great deal of attention by contemporary researchers in the emerging field of organisational behaviour. For instance, the work of James Thompson (1967) on technology and interdependence as well as the work of Perrow (1971) on technology were reviewed by McKenna (2006) and Huczynski and Buchanan (2007). The work of Burns and Stalker (1961) on mechanistic and organic systems, the work of Lawrence and Lorsch (1967) on differentiation and integrations and the literature related to the influence of size on structural dimensions (e.g. specialised roles, formalisation, standardisation, formal or informal, coordination, centralisation and decentralisation) were stressed by Mullins (2007), McKenna (2006) and Huczynski and Buchanan (2007). In addition, cultural aspects such as organisational strength were reviewed by the work of McKenna (2006).

The work of organisational design theorists such as Robey (1991) and Robey and Sales (1994) in the roles various organisational aspects (e.g. management control systems, organisational effectiveness, size,

organisational culture, leadership, skill set, task uncertainty, formalisation and standardisation and centralisation vs decentralisation) play in designing organisations were also reviewed.

Also contemporary researchers such as Lissek, Pine et al. (2006) in the field of social psychology utilise the concept of weak or strong situations, which was developed by Mischel (1977). Galbraith, Downey et al. (2002) pointed out the importance of skill set through the so called 'People Practices', which they considered to be needed in the redesign of organisations. In addition, the importance of coordination, task uncertainty and interdependence in organisations was stressed by the recent work of Nunez, Giachetti et al. (2009). Furthermore, Kreiser and Marino (2002) utilised the concepts of environmental uncertainty, heterogeneity and hostility to describe environmental aspects of organisations. The importance of stakeholders' expectations in organisations was shown by the work of Simmons and Lovegrove (2005). In addition, situational leadership and its application within organisations were described by Mullins (2007) and Huczynski and Buchanan (2007). Also Mullins (2007) and McKenna (2006) explain the role creativity plays in organisations. Moreover, Galbraith, Downey et al. (2002) and Huczynski and Buchanan (2007) advocate the importance of having a business strategy and a reward system within various functions of an organisation.

2.7.1   Conclusions about the Work of Researchers in the Topic of Offices and Organisations

It is concluded from the work of Tapping and Shuker (2003) and Keyte and Locher (2004) that Value Stream Mapping has been applied in offices to tasks that tend to be mechanistic rather than organic. This also confirmed what Emiliani (2007a) and Moad (2008) advocate in terms of the limitations in applying lean tools and techniques such as Value Stream Mapping in office domains. This shows the relation between value stream mapping and office domains in this study.

Since the Viable System Model (Beer 1985), Galbraith Star Model (Galbraith, Downey et al. 2002) and McKinsey 7-S Model (Waterman, Peters et al. 1980) are organisational design models, and offices can be considered as small organisations (Galbraith, Downey et al. 2002), It is considered that the management systems used in these models might be applicable into office domains.

Since offices may interact with the environment too, the significance of uncertainty in understanding the interaction with the environment as advocated by Dill (1958), Duncan (1972), Galbraith (1973), Burns and Stalker (1961), Lawrence and Lorsch (1967) and Thompson (1967) suggested that uncertainty should be considered while understanding offices.

Since technology is defined as the production process type incorporated by the organisation (Thompson 1967, Huczynski, Buchanan 2007, Perrow 1971, Woodward 1965), then technology is regarded to be related to understanding the production process used within offices which are part of organisations.

It is also considered that the concept of interdependence (Thompson 1967) is relevant to office domains, because it can help in understanding the degree or type(s) of interdependence/dependences between organisational units within office domains.

Since Burns and Stalker (1961) argue that firms and their organisational units are located somewhere between the mechanistic and organic organisational structures, which are at opposite ends of a continuum (Burns, Stalker 1961), the mechanistic and organic structure are concluded to be relevant to understanding office domains. Also Magnusen's work, which advocates that there is mix of mechanistic and organic tasks within offices and that there is not a pure mechanistic or a pure organic system within offices, is also considered to be related to understanding the nature of offices.

Since Lawrence and Lorsch (1967) advocate that effective organisations increase their level of differentiation as their environment becomes uncertain because it allows staff to respond more effectively to their particular sub-

environment for which they are responsible. In addition, these effective organisations have the highest degree of integration (Mullins 2007, Lawrence, Lorsch 1967, Huczynski, Buchanan 2007). It is therefore concluded that the concept of differentiation and integration (Lawrence, Lorsch 1967) might be relevant to understanding offices.

Robey (1991) and Robey and Sales (1994) explored the significance of various variables in organisational design. These variables include mechanistic and organic, task uncertainty, interdependence, differentiation and integration, technology, structure, size etc. Since offices can be considered as small organisations (Galbraith, Downey et al. 2002), these variables are therefore concluded to be related to understanding offices and their nature.

Mischel's (1977) work is related to understanding the degree to which a situation (i.e. office task) leads individuals construing the particular events to behave in either a similar/different way. Since the significance of weak and strong situations is related to their relationship with other variables such as uncertainty, discretion, skill set and reward system (Mischel 1977), it is considered that Mischel's weak/strong situations may be related to understanding office domains.

Since the Competing Values Framework is a robust organisational culture model (Quinn, Rohrbaugh 1983, Cameron, Quinn 1999, Cameron 2009) which has been used within organisations to understand a wide of variety of organisational and individual cultural phenomena (Cameron 2009). In addition, offices are considered to be a small organisation as advocated by Galbraith, Downey et al. (2002). Then it is concluded that the competing values framework might be applicable to understanding the culture of offices.

Situation leadership is considered to be suitable to determine the leadership style required by managers within office domains, because Huczynski and Buchanan (2007) advocate that situational leadership can be used to determine the most effective style adopted by managers to influence their followers.

2.8 Final List of Variables from the Perspective of the Initial Objectives of the Project

As mentioned earlier in the literature search rationale in section 2.3, in order to redesign an office it is assumed to be essential to have knowledge and understanding in terms of two dimensions: 1) Knowledge and understanding of the office management systems, which can be used as main design components of the office. 2) Knowledge and understanding of the tools, variables and concepts, which can be used to analyse and understand offices and their management systems. This prompted the need to come up with two assumptions to guide the literature review search: 1) Considering offices as small organisations (Galbraith, Downey et al. 2002), which means that many of the variables used to characterise and analyse organisations may be adapted to understand and analyse offices. 2) All office types have information processing (Tsichritzis 1986), which means that many variables used to understand and analyse information processing within an organisation can be adapted to understand and analyse offices. Consequently, various variables, tools and models have been identified from this literature review. This was concluded to be an opportunity for proposing the fifth research gap of this literature review which is related to the need for using this set of variables within one tool for office redesign as shown in section 2.10.1. The definitions of each one of these variables as well as, the justification of their link to the aims of this study are presented below:

2.8.1 Value Stream Mapping

Value stream mapping is an influential two-dimensional tool of value stream management, which permits the firm to document, evaluate, and analyse a complex set of relationships as well as plot a course to produce an improved operating strategy and organisational design (Keyte, Locher 2004). Value stream mapping has been successfully implemented in offices and service industry such as order-to-cash (Keyte, Locher 2004) and business processes such as insurance claim, employee application, invoice, order, quote, or engineering drawing (Tapping, Shuker 2003). The tool can identify the opportunity for continuous improvements in value, waste elimination, and flow

improvement (Keyte, Locher 2004). This is because the future state map can be utilised to develop lean improvement strategies such as flexibility through multi-skilling workers and parallel working (i.e. reducing cost) (Tashakkori, Teddlie 2003). It also allows a firm to document, measure, analyse a complex set of relationships as well as to draw a course to create an enhanced operating strategy and organisational design (Keyte, Locher 2004). Value Stream Mapping is one of the most significant lean tools and techniques, because Pepper and Spedding (2010) argue Value Stream Mapping needs to be methodically applied before other tools such as 5S to achieve a truly lean operation, which provides the opportunity to implement a lean system.

2.8.2 Technology

It is the production process type incorporated by the organisation (Thompson 1967, Huczynski, Buchanan 2007, Perrow 1971, Woodward 1965), which involves the activities, equipment, systems and knowledge used to convert the inputs of the organisation into required outputs (Mullins 2007, Johns 1992). It is considered significant because it affects the coordination between different units within the organisation and the organisation structure (Thompson 1967, Ghani, Jayabalan et al. 2002) and design (Robey, Sales 1994). However, other researchers argue that its significance as an influential factor in determining structure of the organisation was played down (McKenna 2006) and became limited on its effect to features of structure within its orbit (i.e. close to the shop floor) (McKenna 2006, Pugh, Hickson et al. 1969).

2.8.3 Decision Support Systems

These are systems that offer information to supplement managerial decision making rather than it (McKenna 2006). DSS are found to be compatible with organic activities and its unstructured problems (Robey, Sales 1994). There is a direct relationship between the use of those systems and the level of uncertainty experienced within the organisation (Daft, Lengel 1986).

2.8.4 Management Control System

It is also called control systems, performance management or management control systems (Mullins 2007, McKenna 2006, Chenhall 2003, Robey, Sales 1994). It is used to monitor and evaluate the performance of organisations as a means of developing human resources with productivity strongly in mind (Mullins 2007, McKenna 2006, Chenhall 2003, Robey, Sales 1994). The significance of management control systems lies in two outcomes: 1) Improved job satisfaction for individuals, who can approach their tasks with enhanced information (Chenhall 2003). 2) Enhanced organisational performance as individuals improve their decisions by bringing their goals in-line with the goals of the organisation (Williams 1998) and helping them to better achieve their goals (Chenhall 2003, Robey, Sales 1994).

2.8.5 Organisation Structure

It is the formal allocation of work roles between members of the organisation, as well as the administrative mechanism to control, coordinate and integrate their work activities, so they are directed towards the objectives and goals of the organisation (Mullins 2007, Ghani, Jayabalan et al. 2002, Child 2005). Its significance is due to its effect on performance (Mullins 2007, Galbraith, Downey et al. 2002), job satisfaction, productivity and corporate strategy (Mullins 2007). Wang argues that centralisation vs decentralisation and formalisation and standardisation are the most important aspects of structure (Wang 2001). Although they are not the only structural factors affecting organisation design, they may often be the vital ones and are the two fundamental elements in control and coordination (Wang 2001). Those two variables are explained below:

2.8.6 Centralisation vs Decentralisation

Centralisation is the extent to which the right to make decisions and evaluate activities is concentrated, in particular when decision making is kept with the hands of a relatively small number of people at top level of the hierarchical level (McKenna 2006, Wang 2001, Daft 2001, Fredrickson 1986, King, Sabherwal 1992).

Whereas decentralisation is the opposite of centralisation (McKenna 2006) and it is to locate authority in lowest level possible without losing control (i.e. decisions are delegated to lower organisational levels delegate for example delegate routine matters and centralise significant decisions) (Robey, Sales 1994, Daft 2001). The significance of these variables is also related to the fact that the organisational decisions, which can be either decentralised or centralised, include setting up goals, purchasing equipment, setting prices, choosing suppliers, deciding marketing territories, hiring employees (Daft 2001).

2.8.7   Formalisation and Standardisation

Formalisation is the extent to which rules, standards and procedures that prescribe behaviour & job descriptions are used in the organisation (McKenna 2006, Huczynski, Buchanan 2007, Wang 2001, Fredrickson 1986, King, Sabherwal 1992). Standardisation is the extent to which the method for carrying out each task is standardised using roles and procedures (McKenna 2006, Robey, Sales 1994), it gives a description of the job in terms of defining what is to be done (division of labour) and specifying in detail the method by which each subtask should be carried out (Robey 1991, Robey, Sales 1994).

The significance of these variables is also related to their link to both organisational effectiveness (performance) and size (Robey 1991, Robey, Sales 1994). They are also affected by variety (Perrow 1967), uncertainty (Daft, Lengel 1986) and the type of Thompson's (1967) interdependence (Robey, Sales 1994).

2.8.8   Task Uncertainty

It is the individual's perceived inability to anticipate something in an accurate way (Milliken 1987). It is significant because it is a central concept in organisation theory and design, particularly the ones that seek understanding of the interaction with the environment (Dill 1958, Duncan 1972, Galbraith 1973, Burns, Stalker 1961, Lawrence, Lorsch 1967, Thompson 1967).

2.8.9 Task Complexity

The definition of task complexity was adapted from Schwaninger (2009) and Nicolis' (1995) definition of complexity, it is as the property of being able to assume a large diversity of states or modes of behaviour in a task (Schwaninger 2009, Nicolis 1995). Its significance is due to its relationship with other variables such as task analysability (Perrow 1971), task variety (Beer 1985) (i.e. number of alternative paths of task performance, number of goals, number of inputs, information diversity, number of goals and conflicting dependencies between them etc), uncertainty (Bystrom, Jarvelin 1995), skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988) and discretion (Bystrom, Jarvelin 1995, Tiamiyu 1992).

2.8.10 Skill Set

It is also called 'people practices' (Galbraith, Downey et al. 2002), it represents the collective human resources practices, which enable and empower employees by creating organisational capabilities from the many individual abilities and skill sets existing in the organisation (Galbraith, Downey et al. 2002). Its significance is due to its relationship with other organisational variables such as employee performance, job satisfaction and business strategy, in the sense that it must be described within it (Galbraith, Downey et al. 2002). In addition, it increases in organic offices (Robey, Sales 1994) and is in a direct relationship with creativity (Amabile, Hadley et al. 2002) and task complexity (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988).

2.8.11 Discretion

It is the individual differences in any person's variables, which determines behaviour in a given ambiguously structured situation (Mischel 1977). These situations are ambiguously structured, because people are uncertain about how to categorise it so they end up structuring it in their own terms as they have no clear expectations about the behaviours that are most likely to be appropriate (Mischel 1977). Its significance is due to its relationship with other organisational variables such as complexity in relation to reflecting on its level

(Bystrom, Jarvelin 1995, Tiamiyu 1992). Furthermore, it is in a direct relationship with task uncertainty (Robey, Sales 1994), and it is influenced by variables such as Mechanistic Vs Organic (McKenna 2006, Robey, Sales 1994). In addition, discretion is also influenced by variables such as weak or strong situation (Mischel 1977). For instance in weak situations discretion increases and in strong situations discretion decreases (Mischel 1977).

2.8.12 <u>Task Analysability</u>

It has been defined as the degree to which standardised solutions are available to solve the problems that come up (Robey, Sales 1994, Huczynski, Buchanan 2007, Perrow 1971). Its significance is due to its inverse relationship with uncertainty (McKenna 2006, Robey, Sales 1994, Perrow 1967, Perrow 1971, Nunez, Giachetti et al. 2009) as well as its shared influence along with task variety on coordination (McKenna 2006, Robey, Sales 1994, Perrow 1967, Perrow 1971, Nunez, Giachetti et al. 2009). It is sometimes confusingly called complexity (Nunez, Giachetti et al. 2009) but the working definition of task complexity has been defined differently in this study as shown earlier in section 2.8.7.

2.8.13 <u>Interdependence</u>

It reflects the degree to which members have to exchange information and/or means for the completion of their contribution to the team task (Van Vijfeijken, Kleingeld et al. 2006), it is also the extent to which the work tasks carried out in an organisation by one team member or department affect the task performance and other team members or departments (Thompson 1967, Huczynski, Buchanan 2007). Its significance is due to the need to coordinate interdependent activities (Thompson 1967, Nunez, Giachetti et al. 2009) as well as the coordination problem that exists in each type of technology, which can be resolved through structural designs (McKenna 2006, Robey, Sales 1994, Thompson 1967, Cheng 1983, Victor, Blackburn 1987).

2.8.14 Coordination

It is the management of dependencies between activities, for instance a coordination mechanism is a tool or method used to manage a dependency (Malone, Crowston et al. 1999, Malone, Crowston 1994, Nunez, Giachetti et al. 2009). Its significance is due to its relationship with other variables, for instance, if the interdependence and uncertainty change, the type of coordination mechanism utilised changes (Nunez, Giachetti et al. 2009, van de Ven, Delbecq et al. 1976). In addition, task variety (i.e. task complexity) and task analysability both influence coordination (McKenna 2006, Robey, Sales 1994, Perrow 1967, Perrow 1971, Nunez, Giachetti et al. 2009).

2.8.15 Differentiation and Integration

Differentiation is the extent to which the work of individuals and the tasks, groups and units are divided up in an organisation (Huczynski, Buchanan 2007). Integration is the required level to which units in an organisation are linked together as well as their respective degree of independence (Huczynski, Buchanan 2007). The significance of these variables was stressed when Lawrence and Lorsch (1967) advocated that effective organisations increase their level of differentiation as their environment becomes uncertain. In addition, they increase their level of integration (co-ordination) between individuals in various departments as well as the number of integrative devices to ensure that they are working together towards a common goal (McKenna 2006, Robey, Sales 1994, Lawrence, Lorsch 1967, Huczynski, Buchanan 2007).

2.8.16 Heterogeneity

It is a measure of the number of elements that are different in nature in an environment, hence it is the opposite of homogeneous environment (Thompson 1967, Kreiser, Marino 2002). Its significance, from an organisation's perspective, is related to its focus on differences in various aspects across the company's respective markets (e.g. competitive tactics, product lines, customer tastes, channels of distribution, etc), which require

variations in marketing, production and administrative practices (Miller, Friesen 1984).

2.8.17 <u>Hostility</u>

It is also described by variables such as 'munificence' (Dess, Beard 1984, Kreiser, Marino 2002) or 'illiberality' (Kreiser, Marino 2002, Child 1972). Hostility is a characteristic of environments of having precarious industry settings, harsh overwhelming business climates, intense competition and the relative lack of exploitable opportunities (Kreiser, Marino 2002, Covin, Slevin 1989). Its significance is related to its use as a dimension to measure environmental uncertainty (Dess, Beard 1984, Kreiser, Marino 2002) and has a direct relationship with innovation (Miller, Friesen 1984, Myers, Summer et al. 1969).

2.8.18 <u>Risk</u>

A working definition of risk has been inferred from the work of Chenhall (2003), with a focus on decision making in organisations, as the consequences of committing a mistake in which probabilities can be attached to specific events occurring, they might be as simple as repeating the activity (i.e. low risk) or as serious as life threatening (i.e. high risk). The significance of this variable is related to the influence of high levels of risk on the choice of the decision making type (e.g. standard operating procedure or experiential procedure) used in an organisation (Robey 1991, Lin 2006), which is the heart of organisational operation, as decision making asserts control and reduces uncertainty (Lin 2006, Cyert, March 1963). Lin argues that a nuclear power plant or a military organisation, which tends to be a complex organic system that requires high skills, seems to respond to contingencies and high risk scenarios by using a strict operational procedure with rigid rules. This strict procedure tends to be a mechanistic, which is used within the organic system (Lin 2006). On the other hand, an experiential procedure, which takes a more conventional individual learning approach (Lin 2006), tends to be used to handle contingencies and high risk scenarios in mechanistic systems such as an aeroplane cockpit (Robey 1991). Robey (1991) relates the need for three

organic human judgements (i.e. the pilots) in a mechanistic cockpit, which can be run on fully automatic air travel, to the high risk that may occur and is avoided. Researchers who stated the effect of risk on the nature of the mechanistic or organic tasks such as Robey (1991) and Lin (2006) seem to have given little attention to the incorporation of the effect of risk within a tool that considers office task activities in terms of mechanistic or organic structures. This was concluded to be an opportunity for proposing the third research gap which resulted from this literature review as shown in section 2.10.1.

2.8.19 Stakeholders Expectations

It refers to any group or individual who affects or is affected by the achievement of the objectives of the organisation (Simmons, Lovegrove 2005, Freeman 1984). Its significance is related to the demands imposed by stakeholders on the organisation (Simmons, Lovegrove 2005, Frooman 1999), for instance, a stakeholder might signal conditions or clues for having innovation (Miller, Friesen 1984). In addition, the perceptions of the stakeholder influence the viability of strategic options (Simmons, Lovegrove 2005, Haberberg, Rieple 2001).

2.8.20 Job Satisfaction

It is the attitude of the people in a work context, which is associated with how well the person's expectations at work are in line with outcomes (McKenna 2006). Its significance is related to its importance in human resources management (Chenhall 2003), as well as its relationship with other variables. For instance, job satisfaction may be caused by some organisational factors, such as pay, benefits, promotion, people centred or participative leadership, work group (i.e. supportive colleagues), good safe working conditions (Hodgetts 1991) and MCS/reward system (Chenhall 2003). Job satisfaction is also caused by aspects related to the job itself (e.g. skills variety used to execute the job, interest and challenge derived from the job and lack of role ambiguity) (Hodgetts 1991).

2.8.21 Size

It is the factor that truly influences structural organisational dimensions (Mullins 2007, McKenna 2006, Robey, Sales 1994, Huczynski, Buchanan 2007) such as specialisation (i.e. number of specialised roles and activities), formalisation, standardisation of roles and procedures, mechanism for coordination, and centralisation (Mullins 2007, McKenna 2006). It is usually measured in terms of the number of employees (Mullins 2007, Robey, Sales 1994, Huczynski, Buchanan 2007).

2.8.22 Organisational Culture

Culture is defined as a set of values that assists the organisation's individuals in understanding which actions are regarded acceptable and which are not (Moorhead, Griffin 2004). Organisational culture is important because it represents the shared meanings, values, expectations, underlying assumptions, collective memories and definitions existing within a group in an organisation that gives significance to their action (McKenna 2006, Cameron, Quinn 1999, Schein 1992), and there is a connection between it and performance (Robey, Sales 1994, Berrio 2003, Kotter, Heskett 1992).

A distinction between organisational cultures is in terms of its strength, strong cultures and weak cultures (McKenna 2006, Gordon, Di Tomaso 1992). The significance of this distinction is related to the fact that both the content of cultural assumptions and the strength with which they are regarded is a good indicator of how effective the culture of the organisation might be (Schein 1985). Strong cultures are hard to change as they are similar to Mechanistic systems (Schein 1985) and weaker cultures are similar to organic systems by being more adaptable to external or environmental changes (Robey, Sales 1994, Schein 1985). Strong cultures are capable of only limited change (Gagliardi 1986), however, more freedom in organisations with weak cultures exist (Boisnier, Chatman 2003).

The Competing Values Framework, which is a robust organisational culture model, is adopted in this study. Its significance is related to its use to understand a wide of variety of organisational and individual phenomena

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including theories of organisational effectiveness, leadership competences and roles, organisational culture, financial strategy, organisational design, information processing, organisational quality (Cameron 2009).

2.8.23 Mechanistic Vs Organic

Firms have been categorised along a continuum, with an organic organisation at one end and a mechanistic one at the other end (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007). A mechanistic organisation requires relatively stable conditions and high predictability (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007). An organic structure is the opposite of a mechanistic structure (Robey, Sales 1994, Courtright, Fairhurst et al. 1989). An organic structure is more relevant to the conditions of change when the markets and the technology tend to become unstable and less predictable (McKenna 2006, Huczynski, Buchanan 2007). Their significance is related to their relationship with other variables. A structure is regarded to be mechanistic based on the degree that its behaviour is standardised, however it is regarded organic (or adhocratic) when standardisation is absent (Ghani, Jayabalan et al. 2002, Mintzberg 1979). The selection between mechanistic or organic to some extent depends upon the level of uncertainty (Robey, Sales 1994). It also might depend on task complexity, task analysability and risk (Robey, Sales 1994). Other factors might be if the organisation is driven by creativity or efficiency (Robey, Sales 1994). It is worthwhile to note that the realistic work related to organisational units by Magnusen, which was presented by Robey (1991) and Mullins (2007), advocates that there is no pure mechanistic or a pure organic system, there is always a mix of both types. Researchers who presented the work of Magnusen such as Robey (1991) and Mullins (2007) seem to have given little attention to the impact of his work on office design. This was concluded to be an opportunity for proposing the second research gap which resulted from this literature review as shown in section 2.10.1.

2.8.24 Weak Vs Strong Situation

A working definition of situation was formulated based on the work of Mischel (1977). It is defined as any context or task that involves a set of activities, which may be part of a set of rules or procedures. Mischel (1977) classified situations in terms of weak and strong. A strong situation is a psychological situation (treatment, stimuli) that leads to individuals construing the particular events in the same way whereas a weak situation is psychological situation (treatment, stimuli) that is not decoded uniformly by individuals (Mischel 1977). The significance of weak and strong situations is related to their relationship with other variables such as uncertainty, discretion, skill set and reward system (Mischel 1977).

2.8.25 Leadership Style

The style implies processes do not reside solely in the person and their personality traits; in fact it could be cultivated as distinctive patterns of behaviour (McKenna 2006). The significance of this variable is related to the choice of the suitable leadership style, which is affected by the culture of the business (McKenna 2006), the nature of the workforce, the nature of the task and the personality and skills of the leaders (Tennenbaum, Schmidt 1973). Situational leadership is used in this study along with its various styles. It is a leadership style adopted by managers to determine the most effective style of influencing the followers (Huczynski, Buchanan 2007). Situational Leadership is concerned with having an appropriate style for the developmental level of the followers. Developmental level is defined in terms of the followers' willingness and ability (Allison 2009).

2.8.26 Creativity

It is the application of imaginative thought, which leads to an innovative solution to many problems as well as new ways of seeing things (Mullins 2007, Goodman 1995). Its significance is due to its relationship with time, pressure, employee's attitude towards their jobs (Amabile, Hadley et al. 2002) and organic systems (i.e. through the recruitment of critical mass of creative talents) (Robey 1991, Robey, Sales 1994).

2.8.27 Business Strategy

It refers to the part of the corporate strategy related to one of the firm's divisions or business units; hence a business strategy is formed for all business units that make up the company (Huczynski, Buchanan 2007). Its significance is due to: 1) Strategy is the basis of the design process. 2) Strategy provides common direction for people (Galbraith, Downey et al. 2002). 3) Strategy has an interdependent relationship with the organisation's structure (McKenna 2006, Huczynski, Buchanan 2007). 4) the strategic choices determined by a top management team are influenced by major contingency factors (i.e. technology, size and environment), purposes and goals of the organisation as well as particular attributes of the manager (i.e. personality, experience and value system) (McKenna 2006, Bobbitt, Ford 1980).

2.8.28 Organisational Effectiveness

Zammuto defined it as "human judgements about the desirability of the outcomes of organizational performance from the vantage point of the varied constituencies (stakeholders) directly and indirectly affected by the organization" (Robey, Sales 1994, Zammuto 1984). Its significance is related to its relation with the accomplishment of the organisational goals (Robey, Sales 1994), which are the desired outcome of the undertaken activities of an organisation (Mullins 2007, Robey, Sales 1994).

2.8.29 Reward System

It is the human resource policy and practice, which is based on an open and participative appraisal with two-way feedback (Galbraith, Downey et al. 2002, Huczynski, Buchanan 2007). Its significance is related to how reward systems assist in aligning individual behaviour and performance with the organisational goals, to avoid internal competition, wrong results, low standards and frustration and turnover (Galbraith, Downey et al. 2002, Huczynski, Buchanan 2007). In addition, the choice of the reward system type is influenced by mechanistic and organic systems (Chenhall 2003, Robey, Sales 1994).

2.8.30 <u>Formal or Informal Organisation</u>

This refers to the extent to which an organisational unit is structured (McKenna 2006). A formal organisation is defined as having planned coordination of the activities of a number of people for the attainment of some shared explicit goal through the division of labour and function, and through a hierarchy of responsibility and authority (McKenna 2006, Schein 1988). Whereas, an informal organisation is when the formal organisation's members relate to each other and take part in activities not prescribed by formal organisational systems (McKenna 2006). Its significance is related to how it is influenced by interrelated determinants of behaviour such as formal relationships, task nature, existing ideas within the organisation about accepted behaviours and controls (Lawrence, Lorsch 1967). For instance, a mechanistic office has formal relationship between employees however, an organic office has informal ones (Robey, Sales 1994, Courtright, Fairhurst et al. 1989).

2.8.31 <u>Trust</u>

It is a belief or an expectation that a person can rely on another person's words and actions (Dirks, Ferrin 2001). Its significance is related to its usefulness to the functioning of effective organisations as well as the functioning of its members and their behaviours (Dirks, Ferrin 2001).

2.8.32 <u>Gender Mix</u>

Gender mix is a term formulated in this study to describe the different working practices experienced in the case of men and women as advocated by Mullins (2002). It is considered to be significant in this review, because organisational working practices, which are related to recruitment (e.g. selection), informational communication (e.g. different career advice), career development (e.g. training opportunities, training and development programmes) and attitudes (e.g. male managers avoid sending a women on an assignment or late meetings) tend to have gender bias in favour of men (Mullins 2002).

2.8.33 Pressure

It is defined in this study as the percentage of time the employees spend in processing their daily tasks compared to the overall time. In other words it is ratio between work time and free time (work time: free time), which is a good indicator of the pressure experienced by the employees as a result of their workload. Its significance is related to the influence of time/pressure on the quality of working relationships between the leader and the followers (Kinicki, Vecchio 2006).

2.8.34 History of the Office

It is a term which was formulated in this study to represent the history of the office in terms of issues such as management tenure and the previous performance of the office. The management tenure evaluates the length of time the people in the office have been working. This term was adapted from the work of Miller and Friesen (1984) for characterising organisations.

2.8.35 Resource Availability

It is related to the state of the organisation in terms of the availability of the required human resources and materials (e.g. labour, raw material supply, sources of capital, production facilities… etc) (Miller, Friesen 1984). It was considered more suitable to adapt the representation of this variable in this study based on Miller and Friesen's (1984) work in terms of two main components: 1) Constraints of office layout. The modern layout used in the lean office is an open office layout, which addresses the extent of using barriers between departments, offices and individuals (Tapping, Shuker 2003, McKenna 2006). Minimising these barriers within the open modern office creates a situation whereby more frequent horizontal communication is facilitated (Tapping, Shuker 2003, McKenna 2006). 2) Financial restrictions. Financial restrictions are defined in this study as any limitations or constraints that are imposed on the financial resources of the office (Miller, Friesen 1984).

2.9 Discussion about the Limitations of Lean & Value Stream Mapping in Offices

Radnor argues that most current research in lean tends to focus on presenting case studies of what happened, however the development and application of lean within service sectors such as the public one are still under researched (Radnor 2010). Limitations were found in the applicability of lean tools and techniques within various office types/parts (Emiliani 2007a). Emiliani argues that lean has been limited to certain areas of the office such as operations (e.g. engineering, procurement, and accounting) and has not been applied to areas such as human resources, legal, sales or marketing (Emiliani 2007a). Furthermore, Moad argues that although value stream mapping and Kanban were the bedrock of lean techniques in shop floors, they are proving more difficult to use or less relevant in non-production processes (Moad 2008). It is suggested that value stream mapping can be used for offices with certain characteristics but not others (Moad 2008, Emiliani 2007b). Furthermore, Keyte and Locher (2004) argue that many companies, who successfully implemented lean tools such as Value Stream Mapping in their shop floors, are having tremendous difficulties when addressing information management and problem solving in the non-production and administrative areas. Considering the advantages of improving offices and using value stream mapping in offices, which have been discussed earlier in sections 2.5.3, 2.5.4 and 2.5.5, it was considered imperative to investigate the underlying reasons for the limitations in applying Value Stream Mapping in offices, because they are linked to the aim of this study. This investigation will be further explained by critiquing the nature of two case studies carried out by two main authors on the subject such as Tapping and Shuker (2003) and Keyte and Locher (2004), who implemented Value Stream Mapping in certain parts of the office, as shown below:

2.9.1 Critique – Keyte and Locher's Case Study

As mentioned earlier, although authors on the subject of lean offices, state that there are limitations and difficulties in applying lean tools and techniques in various office parts/types (Emiliani 2007a, Moad 2008, Keyte, Locher

2004), very little attention was given to investigate this limited applicability to find out where lean can or cannot be applied in office domains. Radnor argues that the development and application of lean within the service sectors (e.g. the public sector) are still under researched (Radnor 2010).

For instance, Keyte and Locher (2004) applied value stream mapping merely on the so called "order-to-cash values stream", which he defined as value streams that are related to the nonproduction and administrative activities of an enterprise (e.g. order to cash including quoting new business, taking orders for customer service, creation of invoices and receipt of payment from customers…etc as well as problem solving such as product design and development activities). The work of Magnusen shows how financial tasks tend to be predominantly mechanistic (Robey 1991). On the other hand, problem solving has been an area that is handled using many mechanistic expert systems (i.e. software). Consequently, these task activities are perceived to be more likely mechanistic with certain, analysable and simple tasks. However, the following points will explain, in more detail, how this conclusion was fully reached:

- The case study, which was conducted by Keyte and Locher (2004) for a design and manufacturing company, was investigated and analysed in terms of the variables identified from this literature review to allow us to better understand/analyse the nature of the office they investigated. It was observed from the Value Stream Maps drawn that the case study was applied to areas related to order entry from sales representatives as well as engineering drawings (Keyte, Locher 2004). On the other hand, Keyte and Locher (2004) managed to measure the processing time, lead time, takt time (i.e. pace of customer demand) and optimal number of people needed to process the work for both task activities, which indicates that the task activities are mechanistic, predictable, simple and analysable.

- Furthermore, Keyte and Locher (2004) managed to improve the order entry process by replacing it with an online order-entry function that would reduce lead time and improve the quality of the incoming information. Similarly, the

bill of material BOM effort was automated using the existing feature of the internal software BizSys (Keyte, Locher 2004). These improvements are in the form of automation, in both order entry and BOM processes, which imply that both processes are rather mechanistic, certain and analysable. The authors on the subject of office automation suggest that the successful implementation of automated software implies that all or most office work must be routine, predictable and mechanised (Suchman, Wynn 1984, Noble 1995).

2.9.2 Critique – Tapping and Shuker's Case Study

Tapping and Shuker (2003) applied value stream mapping merely on processes such as an insurance claim, employee application, invoice, order, quote, or engineering drawing… etc, which are perceived in this study to be more likely mechanistic, certain, simple and analysable. However, the following points will explain, in more detail, how this conclusion was fully reached:

• The case study, which was conducted by Tapping and Shuker (2003) for the order entry process of a customer service department of a manufacturing firm (i.e. tier one supplier to the automotive industry), was investigated and analysed in terms of the variables identified from this literature review. This was done to allow us to better understand/analyse the nature of the offices investigated by Tapping and Shuker (2003). It was observed from the Value Stream Maps drawn by Tapping and Shuker (2003) that they managed to identify a sequence of processes, processes steps and work units including time required to measure actual cycle times (Tapping, Shuker 2003). They also measured various times such as order cycle time, queue time for each of the processes, lead time and takt time (Tapping, Shuker 2003). Furthermore, they managed to identify the demand (frequency of orders) (Tapping, Shuker 2003). Tapping and Shuker's (2003) ability to quantify these characteristics of the tasks, reflects that the task activities are mechanistic, certain, simple and analysable.

- The future state map was improved by proposing four strategies to cope with various predicted scenarios, which resulted in a backlog in orders. These scenarios were easily predicted (i.e. low uncertainty level), (Tapping, Shuker 2003), which reflects how demand is predictable.

- In addition, since standardised work was another successful improvement utilised in the future state map for the work, which is repeated (Tapping, Shuker 2003), it implied that work is mechanistic, certain, simple and analysable.

2.9.3 Findings related to the limitations of Value Stream Mapping in offices

The critical review of the literature as well as the case studies of the main authors on the subject of lean offices (i.e. Particularly office value stream mapping) such as Tapping, Shuker (2003) and Keyte, Locher (2004) strongly indicated that the conventional form of value stream mapping has been successfully used to map office task activities, which tends to be mechanistic with certain, analysable and simple tasks. This is considered to be a research opportunity that stresses the need for a new form of value stream mapping to map office task activities, which tends to be organic with uncertain, unanalysable and complex tasks. This research opportunity is presented within the fourth research gap in section 2.10.1.

2.10 **Literature Review Findings**

This literature review conducted in the domain of commercial non-production offices, and their design, together with lean offices and value stream mapping in offices, information processing theory, organisational design theory, organisational behaviour and psychology and organisational dynamics clearly identifies some theoretical positions and gaps in the current literature about redesigning offices with a focus on their management systems to make them run in a leaner and more effective way. These theoretical positions and gaps are explained below:

2.10.1 <u>Gaps in the Current Knowledge</u>

The gaps in the current knowledge are:

1. Most literature indicates how offices and their organisational design have been receiving little attention by organisations by merely focusing on office dimensions such as ergonomics and office physical design as shown in section 2.3. The literature strongly suggests how it is important for organisations to achieve competitive advantage and organisational success through their offices as shown in section 2.5.3, this provides an opportunity to equip organisations with a tool for redesigning offices and their management systems to make them more effective and leaner using the set of variables explored earlier in section 2.8.

2. There appear to be no tools to redesign offices, which can utilise the realistic research of Magnusen that is related to viewing offices in terms of organic and mechanistic task activities as shown in section 2.8.23. This strongly implies that this tool for redesigning offices can lead to the design of modern offices which take into account design issues much wider than layout and ergonomics.

3. There appear to be no tools to redesign offices, which can utilise the impact of the risk level on the nature of the organic and mechanistic task activities of the office as shown in section 2.8.18. This strongly implies that this tool for redesigning offices can lead to the design of modern offices which take into account design issues much wider than layout and ergonomics.

4. The potential application of value stream mapping could provide tremendous advantages, however, the literature suggest that it has been criticised for its limited applicability in various parts/types of the office. One of the limitations of value stream mapping in offices is related to its inability to map organic task activities. Based on Magnusen's realistic research of offices as a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007), this will limit improvements to certain parts/types of the office. The

ability to map mechanistic task activities coupled with the inability to map organic task activities strongly implies that there appear to be a need to modify the current form of value stream mapping or even create a new generation of value stream mapping as shown in section 2.9.3.

5. Based on this literature I propose that there is a strong need to improve offices based on the use of modern design tools and methods, which can help in the better understanding and analysis of offices. This firmly implies that various tools, techniques and variables must be extracted creatively and innovatively from other areas of literature (e.g. mainly information processing systems and theory, organisational design theory and organisational behaviour), in order to complement extra dimensions related to understanding/analysing offices. This was further explained in section 2.8.

6. In summary, this strongly implies that there appear to be no tools or methodologies in the literature for the redesign of office management systems, which takes into account the following considerations: 1) The utilisation of various management organisational variables and models which can help in the better understanding and analysis of offices. These variables and models (e.g. task uncertainty, task complexity, task analysability, weak or powerful, mechanistic/organic, interdependence, coordination, Competing Values Framework, situational leadership… etc.) were creatively inferred from other research contexts. 2) The redesign of an office in terms of seven management systems that represents the various design components of the office. 3) The adoption of Magnusen's research while redesigning an office, which considers that offices are a mix of organic and mechanistic tasks. 4) Since offices are redesigned in this tool in terms of a mix of organic and mechanistic tasks, the impact of the risk level inherent within the tasks on the design of the organic and mechanistic tasks of the office can be adopted within the model, based on the work of Robey (1991) and Lin (2006). 5) The utilisation of both a new generation of value stream mapping that can be used to map organic tasks along with the conventional form of value stream mapping that can be

used to map mechanistic tasks. 6) The introduction of continuous improvements to the model by providing an opportunity to the ongoing use of Value Stream Mapping within the model, which can help in identifying the non-value added activities and provides the opportunity to implement a lean system. 7) The use of the VSM within the model as a framework for diagnosing the office. The five constituent systems of the VSM, can be usefully used as a check of the subsystems of the office (i.e. that are used within the model of this study) to determine if they are present and if they are operating effectively.

2.10.2 <u>Revised Research Objectives</u>

This research work will add to knowledge through the achievement of its revised specific research objectives, these research objectives are:

- To identify variables and concepts that can be used to understand, characterise or redesign offices and their management systems.

- To identify the main office management systems that can be used to redesign offices.

- To explore various organisational models, suitable for representing management systems of the office such as leadership and organisational culture, and identify their limitations.

- To explore and attempt to justify any limitations of the conventional form of value stream mapping in office domains and the services sector.

- To identify a new generation of value stream mapping that is suitable for office domains and can map uncertain, complex and unanalysable organic task activities.

- To develop a methodology of implementation in the form of a set of guidelines for redesigning or diagnosing offices and their management systems, and to add to the existing theory on the role of VSM in office domains.

2.10.3 <u>Research Questions</u>

Having identified the gaps in the knowledge as well as the revised research objectives, derived from the literature review findings, a set of research questions were formulated. A summary of this process is shown in Figure (2.4).

Figure (2.4) illustrates how Creswell's method in identifying the research questions was used in this research inquiry.

Topic (Initial Aim) – General
Offices and the redesign of their management systems

Research Problem – Narrower
Unavailability of tools or methodologies for the redesign of offices and their management systems, which aims to redesign offices while having the following considerations: 1) Utilisation of value stream mapping without limiting its use to only mechanistic tasks activities. 2) This inability of value stream mapping to merely map organic task activities needs to be addressed as it is limiting the redesign and improvement into certain part of the office but not other, because offices are realistically a mix of organic and mechanistic tasks. 3) To provide tools and variables that can help in the better understanding and analysis of offices and their management systems.

Purpose Statement (Revised Aim) – Narrower
To develop a tool or methodology for redesigning offices and their management systems to increase their leanness and make them more effective. This tool can utilise both a new generation of value stream mapping that can map organic tasks along with the conventional form of value stream mapping that can be used to map mechanistic task. In addition, it can use the required management organisational variables and models, which are creatively inferred from other research contexts and yet can be integrated in a novel way within one tool, with the aim of helping the manager to better understand, analyse and characterise offices. Magnusen view of offices as mix of organic and mechanistic tasks is considered within the tool

Research Questions – Specific
RESEARCH QUESTION (1): **What is the list of variables needed to characterise offices and the design of its various management systems?**   **RESEARCH QUESTION (2):** **What are the main office management systems needed to redesign an office?**   **RESEARCH QUESTION (3):** **How can an office be redesigned / diagnosed in terms of each of its main management systems with the aim of making it leaner and more effective?**   **RESEARCH QUESTION (4):** **How can organic task activities, which tend to be complex, uncertain and unanalysable, be mapped using a new version of Value Stream Mapping?**

Source: adapted from (Creswell 2004).

2.11   Plan for the Pilot Studies

This literature review identified gaps in the knowledge as well as various research objectives and research questions, as shown earlier in section 2.10. Various office management systems, which were used by authors (Galbraith, Downey et al. 2002, Beer 1985, Waterman, Peters et al. 1980) of three distinctive and well-established organisational design models, were explored in section 2.6.2. The list of variables needed to characterise offices and the design of its management systems were identified in this literature review in section 2.8. Since, the identification of a final list of sharply defined and measurable variables is necessary for strong theory building (Eisenhardt 1989), this urged the need to carry out an experimental phase in the form of multiple pilot studies, in order to test and refine the findings of the literature review. Because pilot studies can reveal issues which can lead to a stage of 'reconceptualisation' such as identifying new hypotheses that can be further tested (Thietart 2001). In addition, implementing those pilot studies in the early stages of the project can strengthen the validity of this research project, because pilot studies are considered to provide deeper understanding of the phenomenon and the variables related to it (Meredith 1998). Consequently, the pilot study phase in Chapter 3 tests and refines the list of variables, tools and models identified from the literature review in Chapter 2. In addition, the pilot studies will also aim to empirically identify the office management systems which are required to guide the process of redesigning offices, as shown in Chapter 4. The empirical identification of the office management systems is carried out by: 1) Further analysing the pilot study results. 2) Using the constituent management systems of the three organisational design models (i.e. VSM, McKinsey 7-S and Galbraith Star Model), which were explored earlier in this literature review in section 2.6.2, as a check of the subsystems of the office to determine if they were present.

2.12   Summary

This literature survey presented a review of offices, their importance within organisations as a source of gaining competitive advantage and the organisational design of offices. It outlined emergent research in office design

and management philosophies such as the application of value stream mapping within offices. It also discusses the limitations of value stream mapping within offices. In addition, the office management systems required to guide the design process of offices were explored using three well-established organisational design models (i.e. Viable System Model, Galbraith Star Model and McKinsey 7-S). Various tools and techniques for understanding/analysing the nature of offices have been introduced and extracted from various areas of research (e.g. information processing theory and systems, organisational design theory, organisational behaviour, organisational psychology… etc). Various gaps in the knowledge were concluded and uncovered an opportunity to develop a tool for redesigning/diagnosing offices around a combination of creatively identified principles (e.g. value stream mapping, task uncertainty, task complexity, situational leadership, task interdependence, Competing Values Framework… etc), with the aim of increasing office leanness and improving their effectiveness. In addition, the literature review indicated how Magnusen's realistic research of organisational units in terms of a mix of organic and mechanistic tasks have been receiving little attention in the area of office design, which also provided an opportunity to include the concept within the model of this study.

The next chapter, Chapter 3, focuses on testing and refining the literature review findings, which are related to understanding offices and their management systems, by carrying out an empirical pilot study phase.

3   *CHAPTER THREE: Pilot Study – Exploratory Experimental Phase*

3.1   Introduction

The list of variables and systems needed to characterise offices and the design of its various management systems were initially identified in the literature review presented earlier in Chapter 2. Since, the identification of a final list of sharply defined and measurable variables is necessary for strong theory building (Eisenhardt 1989), this prompted the need to carry out an experimental phase in the form of multiple pilot studies. The aim of this experimental phase was to test and refine the findings of the literature review. This was done because pilot studies can reveal issues, which can lead to a stage of 'reconceptualisation' such as identifying new hypothesis that can be further tested (Thietart 2001). In addition, implementing those pilot studies in the early stages of the project can strengthen the validity of this research project, because pilot studies are considered to provide deeper understanding of the phenomenon and the variables (Meredith 1998). Consequently, the pilot studies phase is discussed in Chapters 3 and 4. Chapter 3 tests and refines the list of variables, tools and models identified from the literature review in Chapter 2. The identification process of the final list of variables is done in terms of two dimensions: 1) To test the applicability of the variables identified in the literature review in office domains by comparing them with the themes emerging from the pilot studies. 2) To identify if there are any variables missing from the literature review search that could help in understanding the nature of offices and the design of their management system. It is worthwhile to note that the findings of Chapter 3 are directly related to answering research question 1 of this research project.

Thereafter, the identification of the office management systems required to guide the process of redesigning offices is carried out in Chapter 4. These office management systems are empirically identified by carrying out further analysis of the pilot study results. The literature related to management systems used in three well-established organisational design models (e.g.

VSM, Galbraith Star Model and McKinsey 7-S), which was presented in Chapter 2, is going to be used for the purpose of fully identifying the office management systems. It is worthwhile to note that the findings of Chapter 4 are directly related to answering research question 2 of this research project.

In short, the pilot study phase will be considered as an exploratory experimental phase, which will answer the following research questions:

- **Research Question 1: What is the list of variables needed to characterise offices and the design of its various management systems?**

- **Research Question 2: What are the main office management systems needed to redesign an office?**

3.2   Research Design for the Pilot Study Phase

Ghauri and Gronhaug (2005) argue that the first step in research is to identify whether the problem is structured or unstructured. A problem is unstructured when the nature of its variables are poorly understood (Ghauri, Gronhaug 2005). Referring to the problem of this study, it is concerned with identifying variables related to understanding the offices and the redesign of their management systems, which is also an attempt to test the literature review findings. The nature of this problem tends to be poorly understood, consequently, the research problems of this pilot study phase is unstructured. Ghauri and Gronhaug (2005) argue that exploratory research is used to answer an unstructured problem. In addition, exploratory research is also found suitable to answer the aim of exploring variables, tools and techniques that can be used to understand and analyse offices.

Saunders, Lewis et al. (2006) research process, which is called the onion, was used to structure the research design method used in this empirical pilot study phase. The research process onion of the pilot study phase of this research project is shown in Figure (3.1).

Figure (3.1) illustrates the research process 'Onion' of this pilot study phase.

Research Philosophy

Research Approach

Research Strategy

Choices

Time horizon

Data collection techniques
Interviews & Observations

Cross-sectional

Multi Methods

Case Study

Inductive

Interpretivism
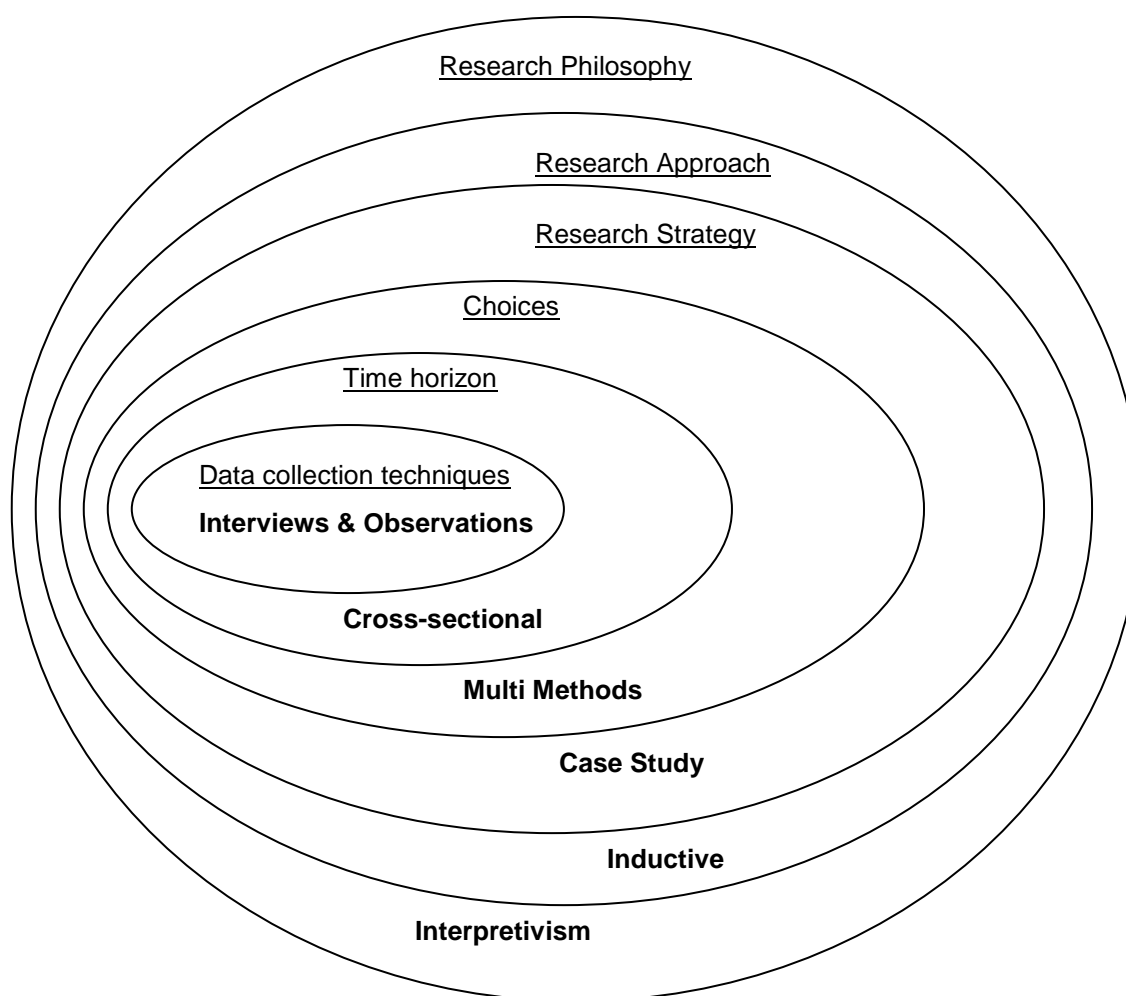
Source: inferred from (Saunders, Lewis et al. 2006).

3.2.1   Research Philosophy and Research Approach

A pragmatist philosophy was used in this research project as a whole (for more details see chapter six). The pragmatist philosophy focuses on using the philosophy that works throughout a project (Creswell 2003), regardless whether it is interpretativist or Positivist (Easterby-Smith, Thorpe et al. 2002). For instance, an interpretativist research philosophy is based on the fact that reality is essentially mental and perceived (Hudson, Ozanne 1988).

An interpretativist philosophy is considered suitable and congruent with objectives of this part of the project (i.e. pilot studies), because Hudson, Ozanne (1988) argue that an interpretativist philosophy is used to understand

a phenomenon from inside in an effort to understand the significations people attach to reality.

Similarly, a pragmatist philosophy could involve either an inductive or deductive approach while conducting a project (Creswell 2003). An inductive approach is more linked with interpretivism and a deductive approach is more linked to positivism (Saunders, Lewis et al. 2006). An inductive approach was chosen in the pilot studies phase of this research inquiry for the following reasons: 1) Interpretivist philosophy is used in the pilot studies of this research (Saunders, Lewis et al. 2006). 2) Inductive approach is related to understanding the nature of the problem by feeling what is happening (Saunders, Lewis et al. 2006). 3) Inductive approach is usually related to collecting interview data and then analysing it for the aim of formulating a theory (Saunders, Lewis et al. 2006).

3.2.2 Research Strategy Design

Case study research was used as the research strategy of this pilot study phase for the following reasons: 1) Case study research is suitable for exploratory research as advocated by authors on the subject such as Bonoma (1985), Ghauri (1983), Yin (2003) and Yin (2009). 2) Case study strategy is suitable when there are too many variables, which are difficult to quantify (Bonoma 1985, Yin 2009), such as many of the variables used in this study task uncertainty, task interdependence, task complexity etc. 3) Case studies are used to fully understand the nature of the relationship between the organisational variables, real-life events and small group behaviour (Yin 2003). 4) Case studies are more rigorous in operations management over other positivist methods such as statistical modelling and optimisation techniques and simulation (Meredith 1998). 5) Case studies provide a thorough interpretation of "what" research questions (Meredith 1998), which are used in research questions one and two of this research inquiry as shown in section 2.10.3 in Chapter 2. 6) The use of case study research in the early stages of a research project, which is characterised by having a lack of understanding in the phenomenon and the variables related to it, strengthen the validity of the whole research inquiry (Meredith 1998). 7) Creswell argues

that case study research is an example of various qualitative strategies (Creswell 2009). 8) Case Studies allow the phenomenon to be understood through the concept of triangulation, where different sources of data provide an opportunity to cross-check their evidence (Meredith 1998). 9) Case study research must seek to build a theory (Bryman, Bell 2007, Voss, Tsikriktsis et al. 2002, Stuart 2002, McCutcheon, Meredith 1993). 10) Case study research provides tools and techniques, which can compare between variables and characteristics across organisations (Stuart 2002), such as the use of the pattern matching technique, as shown in section 3.2.8.

Multiple case study design (i.e. two case studies) was used in the pilot study phase of this research project, because, they provide compelling and rigorous evidence when compared with single case study design (Herriott, Firestone 1983). They provide great benefits when particularly used to investigate a phenomenon that is slightly understood and much is still to be explored (Yin 2003). They also provide stronger evidence to the research inquiry through their vigorous findings, which can help in generalising the theoretical findings to a bigger population (Yin 2003).

The pilot studies phase was ultimately carried out as part of a theory building from case study research. Consequently, theoretical sampling was used to select the type of case studies for theoretical reasons rather than statistical reasons as advocated by Glaser and Strauss (1967). The selection strategy adopted in this pilot study phase aimed to fill the theoretical category (i.e. organic and mechanistic cases) while giving examples of polar kinds (Eisenhardt 1989, Miles, Huberman 1994), which is a form of the extreme case sampling technique (Creswell 2004, Patton 2002). Consequently, two pilot studies of two offices were selected in this study. The first case exhibited predominantly organic characteristics whereas the second case exhibited predominantly mechanistic characteristics. This was done because mechanistic and organic structures are opposite to each other (Robey, Sales 1994, Courtright, Fairhurst et al. 1989) and have received a great deal of attention from many authors (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007, Magnusen 1977),

who agree that any organisational unit fits within a quantum of a mechanistic system in one end and an organic system in the other. However, Magnusen states that there are no pure mechanistic or organic offices; there is always a mix between both (Robey 1991). This raised the issue of investigating which part of the office is mechanistic and which part is organic for each of the case studies. However, an initial attempt was also made when selecting an office that represents a mechanistic or organic system to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991). Magnusen advocates that a research office has the least percentage of mechanistic tasks (i.e. up to 7% percent mechanistic tasks). Based on this, it was considered that selecting a research office for the first case study is representative of offices which exhibit predominantly organic characteristics. On the other hand, Magnusen advocates that a finance office tends to have the highest percentage of mechanistic tasks and the least percentage of organic tasks (i.e. up to 36% organic tasks) (Robey 1991). Based on this, it was considered that selecting a finance office is representative of offices which exhibit predominantly mechanistic characteristics. In addition, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office was interviewed to indicate what part is organic and what part is mechanistic. This is further explained in the discussion of section 3.2.6.

Pure qualitative research was considered to be suitable in this pilot study phase for the following reasons: 1) Marshan-Piekkari and Welch (2004) and Ghauri and Gronhaug (2005) argue that qualitative research is typically used. Also Ghauri and Gronhaug (2005) advocate that qualitative research is most useful when the research problem is unstructured, which is the case in this pilot study phase. 2) Strauss and Corbin (1990) argue that qualitative research is quite suitable for studying organisations, groups and individuals, which is also congruent with the aim of this pilot study phase. 3) Ghauri and Gronhaug (2005) argue that the key purpose of qualitative research is to gain insight and understand, as it tends to be exploratory and flexible, which is also congruent with the aim of this pilot study phase. 4) Gillham (2000) argues that qualitative research is an effective way to start research with the aim of

exploring a phenomenon, where full understanding of the theory dictating the situation or variables related to it are unknown. This is also congruent with the aim of this study.

3.2.3   Data Collection Techniques & Time Horizon

Saunders, Lewis et al. (2006) defined research techniques as the tools used to obtain and analyse research data, including questionnaires, observation, interviews, and statistical and non-statistical techniques. Ghauri and Gronhaug (2005) and Jankowicz (1991) defined them as the step by step procedures that are followed to collect data as well as case study evidence, which are then analysed with the aim of finding answers to the research questions (i.e. it is concerned more with how to do things rather than why to do it and what to do), such as interviews, observations and surveys. As shown in Figure (3.1), the data collection techniques used in the pilot studies phase are personal guided open-ended interviews as well as observation as the main data sources as advocated by Ghauri and Gronhaug (2005) and Yin (2003), because this case study is a "description of a management situation" (Ghauri, Gronhaug 2005). In addition, the questions used within the interview protocol were open ended questions, which utilised the funnel technique.

The time horizon of a study is characterised in terms of two options, cross-sectional and longitudinal study (Saunders, Lewis et al. 2006). Saunders, Lewis et al. (2006) emphasise that the research strategy a researcher is pursuing is independent of these time perspectives. The cross-sectional approach, which is also called a snapshot approach, is employed when a study of a particular phenomenon (or phenomena) is undertaken at a particular time (Saunders, Lewis et al. 2006).

Consequently, it will be correct to define the time horizon of the pilot studies phase as cross-sectional, because the initial interviews were conducted at a particular time for two offices of an academic institution located in the East Midlands of England, UK. Furthermore, all interviews and observations took place within the same year in a period of almost three months.

Reliability tests were used to reduce any biases or errors in this case study research as advocated by Yin (2003) and Amaratunga, Baldry et al. (2002). Rowley argues that it can be carried out by having proper documentation methods as well as accurate record keeping, which will also avoid repeating the same work (Rowley 2002). Two tactics were used in this pilot study phase to strengthen their reliability as advocated by Yin (2003). These tactics are shown below (Yin 2003):

1) A case study protocol was developed. Case study protocol which is the principal documentation required to assist the researcher by organising his/her visits to the research sites, keeping him/her focused on the type of data required and making sure that the sources of evidence are fully documented (Stuart 2002). Please see Appendix (F) for the case study protocol of this pilot study phase, which was designed using a structure advocated by Yin (2003).

2) A case study database of the raw material collected was used to enable the process of independent inspection. This is because a case study database contains information such as notes, documents, narratives and tabular material (Yin 2003). Please see Appendices (M and N) for the database of this pilot study phase.

Eisenhardt (1989) and Yin (2003) agree that having multiple data sources strengthens the construct validity and enable triangulation (Eisenhardt 1989), for this reason various data collection techniques were adopted in this pilot study. These are explained below:

3.2.3.1. Direct Observation

Creswell (2004) defined observations as "the process of gathering open-ended, first hand information by observing people and places at a research site". Observations can be used along with answers of the respondents collected through interviews to detail reality and people in natural settings (Amaratunga, Baldry et al. 2002). A non-participant observation technique was used within this pilot study phase, because the observer is not part of the

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situation (Ghauri, Gronhaug 2005, Sekaran 1992). It was carried out, as recommended by Sekaran (1992), where a researcher is required to sit in a corner of the office and observe how individuals spend their time.

Although, Creswell (2004) suggests that an observational protocol should be prepared to take the field notes during visits to the research sites. Sekaran (1992) suggests that observations should be unstructured in the sense that no specific ideas for the particular aspects of interests should be identified. Since, this pilot study is rather exploratory, the type of observation technique that is considered to be most suitable for the pilot study is unstructured.

Furthermore, this form of data collection technique was found appropriate in this pilot study phase for the following reasons:

1) It entails listening and watching people's behaviour in a way that permits learning and analytical interpretation (Ghauri, Gronhaug 2005).

2) It permits the researcher to make some generalisations on how the employees normally spend their time (Sekaran 1992). For instance, data related to atmosphere of the workplace, with any of three main aspects, were collected: A) The interaction with the customers, such as understanding the nature of interaction with customers, the factors considered while handling them and the procedures followed or carried out to handle their query. B) The physical environment, such as understanding the physical layout of the office, any physical restrictions, the technology systems, any employee's surveillance. C) The general atmosphere, such as number of people, understanding interactions among individuals, the managers' visits and their activities during the visits, rules and procedures, the frequency of the interaction between others, the interdependence between them, if they communicate with each other in a formal or informal way, and if the work atmosphere is stressful or pleasant.

3.2.3.2. Interviews

Kvale (2007) defined interviews as "an interview where knowledge is constructed in the interaction between the interviewer and the interviewee". Yin states that interviews are essential sources of case study information, as they are guided conversations rather than structured queries (Yin 2003, Yin 2009). Bryman and Bell argue that many researchers use semi-structured interviews, if multiple case study research is adopted (Bryman, Bell 2003), because semi-structured interviews provide the researcher with a structure that can enable cross-case comparability (Bryman, Bell 2003). Since this study uses a multiple case study research, then semi-structured interviews are considered to be suitable. As shown in Appendix (G), an interview protocol (Creswell 2003) was used in this pilot study, which enabled the researcher to change the sequence of the questions by providing the interviewer with the ability to ask more questions as s/he picks up on issues mentioned by the interviewees (Bryman, Bell 2003).

Ghauri and Gronhaug (2005) argue that if an interview is in-depth, then the researcher gains a more accurate and clearer picture about the facts, opinions, behaviours and position of a respondent. In-depth interviews were used in this pilot study phase because they are well-suited with exploratory studies (Ghauri, Gronhaug 2005).

The personal interviews, used in this pilot study, were face to face guided interviews (i.e. semi-structured) that are open-ended. The interviews took this form for various reasons: 1) This type of interview is most suitable for exploratory studies, particularly when the researcher is trying to control situational factors (Sekaran 1992). 2) It enables the researcher to explore, understand and discuss complex topics, particularly topics that are difficult to articulate (Sekaran 1992). 3) This type of interview allowed the researcher to cope with identifying the characteristics of various types of tasks in terms of mechanistic and organic, because according to Magnusen, offices are realistically a mix of mechanistic and organic (Robey 1991).

These interviews were also audio recorded and the duration of each interview was less than 30 minutes, because Ghauri and Gronhaug (2005) argue that interviews should be no longer than 1 hour and 30 minutes. Both qualitative data collection and analysis had to be carried out concurrently. It was found that six in-depth interviews were adequate to identify the themes when the opinions and views emerging were showing consistent patterns and no new information had emerged by interviewing extra people. In addition, two of the interviews were carried out at the beginning with the manager of each office as they gave a view about the variation of tasks in the office which helped in determining the appropriate number of people required to be interviewed. Since six employees and the manager of each office were interviewed, it is considered to minimise bias and enhance the reliability of the collected data (Ghauri, Gronhaug 2005, Voss, Tsikriktsis et al. 2002) and they were considered to provide a reasonable trade-off between efficiency and richness of data (Voss, Tsikriktsis et al. 2002). As a result, four respondents were asked to answer the interview protocol in each case study.

The interview protocol used in this pilot study phase, shown in Appendix (G), illustrates how one question is related to explaining tasks and two questions are related to having insight about the interviewee's opinions about what is important or not important in their office. Yin and Voss state when questions are related to opinions or attitudes of an interviewee, corroborating these opinions or attitudes against both opinions of the other respondents as well as other sources of data such as observations would be adequate to get a feeling of the prevailing opinions (Yin 2009, Voss, Tsikriktsis et al. 2002). This is why triangulation using multiple sources of evidence was used in this pilot study phase.

Furthermore, open-ended questions were used within the questionnaire for various reasons: 1) The Interviews used in this pilot study phase are in-depth, which requires the respondents to be provided with the freedom to answer according to their own thinking as the answers of open-ended questions are not constrained by having few alternatives (Ghauri, Gronhaug 2005). 2) Open-ended questions have a qualitative nature, which perfectly fit exploratory

studies (Ghauri, Gronhaug 2005). 3) Open-ended questions allow the respondent to give answers in any way they choose (Sekaran 1992).

3.2.4 Data Analysis

Miles and Huberman (1994) argue that there is not a general method for analysing qualitative data. Eisenhardt (1989) advocates to carry out the analysis in two stages in multiple case study design, the first stage is within case analysis to deal with the reality of staggering amounts of data, and the second stage is cross case analysis with the aim of searching for cross-case patterns.

3.2.4.1. Within Case Analysis

Multiple data sources were used simultaneously in the data collection phase of this pilot study. These include direct observations and interviews. Eisenhardt (1989) described this simultaneous process as triangulation by using multiple data collection methods, which provides this research inquiry with both stronger substantiation of constructs and hypotheses (Eisenhardt 1989) and construct validity (Yin 2003). Consequently, after interviewing various respondents in each case study, the interviews were transcribed to be then analysed. The evidence of the analysis was then corroborated using direct observation field notes. In other words, these different types of data were linked to confirm and validate one data against the other. This assisted in creating analysis with richer details and urged the emergence of new innovative viewpoints (Miles, Huberman 1994). In addition, triangulation using multiple sources of evidence helped in establishing a chain of evidence, which strengthens the construct validity of this pilot study phase (Yin 2003). In addition, triangulation of different sources of data, helps the use of explanation building (i.e. a form of pattern matching that aims to analyse case study data by building explanation about the case), for instance to create explanations of an observed phenomenon, supported by interview findings (Yin 2003, Yin 2009).

Creswell (2009) advocates the blend of general steps with the particular research strategy steps. He developed a method and advocates that qualitative researchers should follow it. In Creswell's method the qualitative inquirer must look at the analysis as following stages from the specific to the general by including several levels of analysis (Creswell 2009). His method, shown in Figure (3.2), consists of six steps to analyse qualitative data, where a linear hierarchical bottom to top approach is suggested.

In this research, Creswell's method was used to analyse the data of each pilot study. The steps were followed as shown below:

1) The interviews and field notes were transcribed and then arranged into computer folders in terms of the source of information (Creswell 2009).

2) All the data was read to get an overall sense of the information and allow reflections on their general meanings to emerge (Creswell 2009).

3) The data was coded. Coding is the process of organising the raw material into chunks or segments of text prior to giving a meaning to the information (Rossman, Rallis 1998). Creswell described it as the process related to taking text data or pictures collected while gathering data as well as segmenting paragraphs, sentences or images into classifications and labelling each classification using a term.

4) A description of the people or natural settings was produced using the coding process. This also involved categorisation and analysis of themes, where a small number of themes and categories were generated. Although Creswell suggests the use of Teschs' eight steps, Bryman and Bell's (2007) stages of coding were adopted in this part of the research, because they were found to be more structured and easier to follow. Bryman and Bell's (2007) stages of coding are below:

   a) The process of coding started as soon as the data collection process began with the aim of sharpening the researchers' understanding of the gathered data as it arrived. This was done for two reasons. First,

Bryman and Bell (2007) advocate that being swamped in data can be avoided by conducting early coding. Second, Miles and Huberman (1994) argue that late coding is the main reason for weakening the qualitative data analysis.

b) The text was read as a whole and notes were made at the end. This was done by studying the research objectives and the interviewees' transcripts to highlight major leading theoretical topics found. Minichiello, Aroni et al. (1990) called these theoretical topics the coding scheme, whereas Attride-Stirling (2001) called it the coding framework. These theoretical topics were then used to list a set of words or topics, which described and represented an overall meaning of the text. Minichiello, Aroni et al. (1990) argue that this coding scheme helps in generating a list of words which can be linked into common classifications whilst carrying out the analysis. According to Minichiello, Aroni et al. (1990), three various types of codes were used: concept to represent a specific idea, individual word to represent a situation and a sentence that capture an event of interest.

c) The text was read again. This stage is related to going through the transcripts again and marking the text using brackets and highlighting pen. This is called hand analysis and it was used because the number of pages was less than 500 pages (Creswell 2004) (i.e. seven pages for the research office case study and eight pages for the finance office case study). Creswell argues that hand analysis allows the researcher to keep a close interaction with the qualitative data in order to make sense of the meanings for better interpretation (Creswell 2004). This meant that the transcripts were divided into meaningful fragments for the manageability of the data. A word/code was given to represent both the fragment or text segment and giving it a perceived meaning as well as linking it to the pre-defined coding scheme (Attride-Stirling 2001).

Figure (3.2) illustrates Creswell's data analysis process in qualitative research.

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                          ┌─────────────────────────────────────────────┐
                          │  Interpreting the Meaning of Themes/Descriptions │
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                                              ▲
                          ┌─────────────────────────────────────────────┐
                          │        Interrelating Themes/Description        │
                          │        (e.g., grounded theory, case study)     │
                          └─────────────────────────────────────────────┘
                              ▲                                    ▲
                    ┌──────────────┐                    ┌──────────────┐
                    │    Themes     │                    │  Description  │
                    └──────────────┘                    └──────────────┘
                              ▲                                    ▲
  ┌──────────────┐  ┌─────────────────────────────────────────────┐
  │ Validating the│  │         Coding the data (hand or computer)    │
  │ Accuracy of the│ └─────────────────────────────────────────────┘
  │ Information   │                      ▲
  └──────────────┘  ┌─────────────────────────────────────────────┐
                    │            Reading through All Data           │
                    └─────────────────────────────────────────────┘
                                        ▲
                    ┌─────────────────────────────────────────────┐
                    │     Organising and Preparing Data for Analysis │
                    └─────────────────────────────────────────────┘
                                        ▲
                    ┌─────────────────────────────────────────────┐
                    │   Raw Data (transcripts, fieldnotes, images etc.) │
                    └─────────────────────────────────────────────┘
```
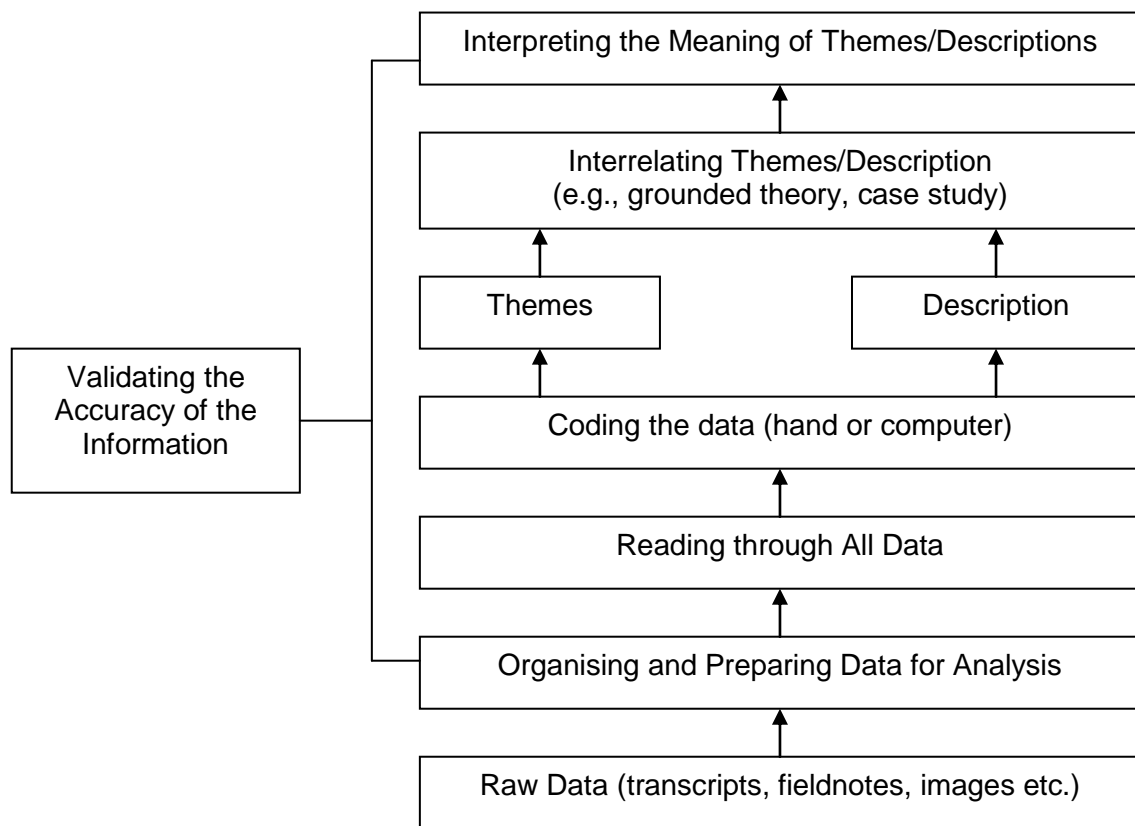
Source: (Creswell 2009).

d) The coded text was reviewed. This stage was done by systematically marking the text, in a way that every occurrence of the issue was coded. In addition, an attempt was made to find codes with basic themes during this review. This review also involved manipulating the codes by eliminating repetition, combining similar ones and grouping them.

e) More general theoretical ideas were linked to the coded text. This stage is about adding our own interpretations to make sense of it. It was done in more detail in the next step of Creswell's method, which is related to the analysis of the qualitative data.

5) The fifth step of Creswell's method was carried out by doing qualitative analysis, which is related to identifying a suitable way to present the

description and themes (Creswell 2009). Eisendhardt argues that there is no standard format for such analysis (Eisenhardt 1989). Since, the main objective of this pilot study phase relates to identification of variables that are used in a practical sense by the respondents of two case studies to characterise offices as well as their management systems. The qualitative analysis was initially carried out within case analysis using Creswell's method (Creswell 2009) to analyse each case study individually. The results of the analysis were presented using a tabular display of evidence, developed by Miles and Huberman, because it is helpful in the topic of building evidence for constructs (Miles, Huberman 1984).

6) The sixth step in Creswell's method was carried out by making interpretations or meanings to the data. These are the lessons learnt as well as the perceived meanings depicted from a comparison between findings with information gleaned from theories or literature, which allowed the researcher to elaborate if the findings confirm with past information or diverge from it (Creswell 2009). This step is very much related to one of the objectives of this pilot study phase by testing and refining the list of variables that can be used to understand and characterise office, which were identified from the literature review. This step also leads to a brief discussion in terms of cross-case analysis.

3.2.4.2.   Cross – Case Analysis

After analysing the data from each case study separately, based on Eisenhardt (1989) work the final step of the analysis was related to the cross case comparison, which aimed to search for cross-case patterns (Eisenhardt 1989). She suggested a tactic of selecting pairs of cases and then listing differences and similarities among each pair, as it pushes the researcher to identify the subtle differences and similarities between cases (Eisenhardt 1989). She argued that searching for similarities between a seemingly dissimilar pair of case studies can provide more refined understanding. This can include the identification of new concepts and categories, which were not predicted by the researcher (Eisenhardt 1989). Also Voss, Tsikriktsis et al. (2002) argue that cross case analysis improves both the generalisability of

findings drawn from each case alone as well as the emergence of accurate and reliable theory that is stronger. Furthermore, Rowley (2002) argued that analysing the cases in relation to each other strengthen the robustness as well as quality of the findings.

This cross case analysis was not done to judge on the significance of any of the variables in terms of its frequency in both case studies. The search for cross-case patterns mainly focused on identifying the basic themes that emerged in both case studies as well as the ones that emerge in one but not the other. This search was done mainly to provide more understanding about the characteristics of the organic and mechanistic nature of offices and to compare these themes with the literature review findings, as an attempt to confirm and refine the findings of the literature review (Creswell 2009). This was described by Yin as pattern matching, where an empirically based pattern (i.e. pattern emerged from case studies) is compared with a predicted one, which may be predicted from the literature (Yin 2003). Yin argues that pattern matching strengthens the internal validity of the study (Yin 2003). Put simply, the variables identified from the literature review, which were predicted to help in characterising offices as well as the redesign of their management systems, were compared with the findings from the two case studies of this empirical pilot study phase.

Another form of pattern matching, which was carried out during the analysis is explanation building (Yin 2003). Explanation building aims to analyse each case study data by building an explanation about the case (Yin 2003). It was thought to be suitable for pilot studies as Glaser and Strauss (1967) advocate that it can be used as a parallel procedure for exploratory case studies with the aim of being part of a hypothesis-generating process as well as developing ideas for further study. Explanation building was used in this study to create explanations of observed phenomenon, supported by findings from interviews

This search for cross-case patterns was done by selecting two polar types of offices (i.e. an office exhibiting predominantly organic characteristics along

with an office exhibiting predominantly mechanistic characteristics) as the comparison category, then a search for differences and similarities between those categories was conducted (Eisenhardt 1989, Yin 2003, Voss, Tsikriktsis et al. 2002, Miles, Huberman 1994). This comparison was also done in the form of a table as advocated by Miles and Huberman (1984), because they were considered an effective tool in the topic of building evidence for constructs (Miles, Huberman 1984).

3.2.5 Quality of Research

Various considerations have been taken to ensure that rigour and validity of the research process and outcomes are maintained. The validity tests used within this pilot study phase were based on the work of Yin (2003) and are summarised in Table (3.1).

Table (3.1) shows the validity tests and considerations used in the pilot study.

Test	Case Study Tactic	Tactics Carried Out in Pilot Study Phase
Construct validity	• Triangulation by using multiple sources of evidence • Establish chain of evidence	• Triangulation through multiple data sources (i.e. interviews and direct observations) • Established chain of evidence by allowing an external observer to follow the derivation of any evidence from initial research question to ultimate case study conclusion • Established chain of evidence through triangulation
Internal validity	• Conduct pattern matching • Conduct explanation–building	• Coding of data and the use of tabular display of evidence • Create explanations of observed phenomenon, supported by findings from interviews
External validity	• Use theories in single case studies	• Ensure that research design addresses the theoretical questions
Reliability	• Use case study protocol • Use case study database	• Case study protocol was used as a tool for guidance as well as communication of intentions within the research sites • Databases were created to gather all important information together

Source: Adapted from (Yin 2003).

3.2.6   Actual Data Collection and Analysis – Individual Pilot Studies

Each case study used in this empirical pilot studies phase is going to be presented individually. Because, according to Eisenhardt (1989) and Pettigrew (1990), it is imperative to write, analyse and present each case study individually in order to generate insights. The choice of the organic and mechanistic cases was guided by the following reasons: 1) Choosing two offices of an academic institution with one primarily exhibiting organic tasks and the other primarily exhibiting mechanistic tasks. 2) Other theoretical reasons that are summarised in Table (3.2).

Table (3.2) illustrates the type of case study used in the pilot study phase of this research as well as the reasons for selecting it.

Case Study	Why select it?	Organisation Kind
Academic Institution – Finance office	• An office that exhibited predominantly mechanistic characteristics • Availability of an established contact who can provide reliable access • Easy access to further data if needed	Educational Sector
Academic Institution – Research Office	• An office that exhibited predominantly organic characteristics • Availability of an establish contact who can provide reliable access • Easy access to further data if needed	Educational Sector

The case studies used in this pilot study phase are:

3.2.6.1.   Research Office

The case study was carried out for a research office, which was part of an academic institution that had more than 2500 employees. The academic institution was located in England, UK. The office was an autonomous R&D office. It was also decentralised and functional. An initial interview was carried out with a supervisor of the office to confirm that the office was homogeneous with about 95% organic tasks (i.e. this makes the office representative of an

organic extreme type). It was differentiated from the department and yet fully integrated using IT systems, various coordination modes and communication with key people (such as supervisor and research coordinators etc). This initial interview was guided using an interview protocol shown in Appendix (H).

The office was small and consists of nine researchers (e.g. two females and seven males). Each one of the employees was leading a project in a particular area, which made the office have a pooled interdependence, according to Thompson (1967). The age range of the employees was between 26 and 50. The office operated eight hours per day; however, the attendance of the employees seemed to be discretionary up to a certain extent. For instance, they might attend the office for a few hours in a particular day or even stay for much longer depending on their work schedule. Each one of the researchers had (1-2) supervisors, who would be a common supervisor with other researchers in the office. The supervisors were usually located in a different office within the same building.

As mentioned earlier, the data was collected in this case study using two sources of data. The first source of data came from interviews and the second was direct observations.

As mentioned earlier, the interviews were semi-structured, face to face and in-depth. Emails were used to communicate with each of the interviewees, before starting the interviews with the aim of explaining the study as advocated by Easterby-Smith, Thorpe et al. (2002). The interviews were carried out in a period of two weeks on a one to one basis. The interviews were carried out mainly with three senior workers of the office. The interviewees were familiar with all the activities of the office and had considerable experience in the office.

An interview protocol shown in Appendix (G) was used to guide the interviews (Creswell 2003). The first page of the interview protocol contained general information such as the name of the firm, the name of the interviewee and his/her position. The list of questions used were guided and shaped by the aim of the pilot studies, consequently, the questions were mainly related to

identifying the underlying themes used by various interviewees to characterise the office and its various management systems. See Appendix (G) for the questions of the interview protocol.

Mock interviews were carried out with other researcher colleagues to test the questions of the interview protocol before carrying it out. The actual interviews were carried out in a suitable quiet place within the office. A total of four interviews were carried out as shown in this case study database in Appendix (D). The first interview was carried out with the manager to have general understanding of the office in terms of its mechanistic and organic mix of tasks and to identify the right people that are required to be interviewed. Thereafter, three other interviews were carried out with three employees in the office to identify various themes used by them to describe the office. This makes the number of the respondents used to identify the themes three as shown in section 3.2.7. At the beginning of each interview, the aim, duration and the way the information were intended to be used was explained to the interviewees. Also, the option of anonymity was given to all the respondents. The design of the questions of the interview protocol was explained earlier in section 3.2.3. The questions were mainly open to reflect their qualitative nature. However, the funnel interview concept advocated by Sekaran (2003) was used when answering each of the questions of the interview protocol. This meant that a question was asked in a broad way then it was gradually narrowed down to more detailed issues that are most related to the research (Sekaran 2003). All interviews were audio-recorded to ensure accurate transcription and unbiased note taking (Easterby-Smith, Thorpe et al. 2002).

The second source of data was direct observations of the office and its management systems. The direct observations started by obtaining permission from the people working in the office to access the office and observe it under normal working conditions. Two sessions were carried out as shown in this case study database in Appendix (D). This allowed the use of triangulation using multiple data sources. It was conducted by sitting in a corner of the office and observing how individuals spend their time as recommended by Sekaran (1992). Non-participant observations were used

(Sekaran 1992), where the intention was not to participate in doing the work, but rather to corroborate the evidence from the observations with the evidence from the interviews. The observations were unstructured (Sekaran 1992), because this study was exploratory, however, it focused on gathering field notes in terms of two main aspects of the office: 1) The physical environment 2) The general atmosphere of the office.

It was observed that the office layout was open with desks separated using low segregators and compartment draws. In addition, the technology systems used and the nature of the interaction between the employees were both recorded. For instance, it was observed that people tended to be almost independent with very little interaction, as each one was conducting his/her own research. The supervisor visited the office infrequently; however the nature of interdependence with him/her tended to be reciprocal. It was detected that various employees communicated with their own supervisor in various frequencies. Some researchers communicated with their supervisor in a weekly basis, whereas others communicated with him/her every two weeks. It was observed that there were very little rules or procedures as people walked in or out at any time and interacted with each other in a very informal way. Although the employees seemed to be friendly to each other, they generally appeared to be stressed and working under pressure.

The data analysis approach used in this case study, as explained earlier, followed Creswell's method for analysing qualitative data (Creswell 2009). His method, shown in Figure (3.2), was used along with Bryman and Bell's coding stages (Bryman, Bell 2007). A sample of how the text was coded for this case study is shown in Table (3.3). Furthermore, Table (3.3) shows an example of how various themes emerged from the Task Description code, which was used to extract text that is most relevant to the objectives of this study. A summary of all the codes as well as the basic themes emerged from the coded segments of text is presented in Table (3.4).

Table (3.3) illustrates how the answer of respondent 3 of the organic case study was coded, as well as the basic themes extracted from it.

Code	Quoted from the answer of Respondent 3	Emerging basic themes
Task description	*"There is an overall structure, which defines the overall objectives of various tasks, phases, which is the structure of my research I cannot decide the details of those tasks, because the nature of the job is complex and unpredictable. Sometimes, you can do various tasks at the same time, however most of the time, you can only start one phase and know more detail about after you finish and get feedback from the previous one."*	Task Uncertainty, Task Complexity, Task Analysability, Malone, Crowston et al.'s (1999) Dependency – Producer/Consumer Prerequisite Relationship, Simultaneous Tasks, Managing Goals Tasks and Subtasks, Technology, Feedback Driven, Coordination, planning, Mechanistic / Organic
TRIANGULATION USING OBSERVATIONS:		
• It was observed that the employees were carrying out their individual projects, because they hardly interacted with each other. This gave an impression that they were organised, driven and followed a plan. • The fact that the office is a research office meant that it is more likely to exhibit organic characteristics according to the research of Magnusen (Robey 1991).		

Table (3.4) illustrates the codes used for the three respondents of this case as well as the emerging basic themes extracted from them.

Codes	Emerging Basic Themes
• Importance of relationship with manager • Goal achievement barriers • Co-worker's relationships • Decision making • Tasks description • Unimportant routine tasks • Relationship with manager • Job requirements • Job aim • Characteristics of goals • Outcome requirements • Working independently	• Differentiation / Integration • Coordination • Organic / Mechanistic nature • Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level • Technology systems used • Thompson's (1967) technology type • Shared values • Competing Values Framework (Flexible / focused dimension & External / internal dimension) • Thompson's (1967) interdependence • Task Uncertainty • Management control system/Reward system • Business strategy / organisational effectiveness • Creativity • Task complexity • History of the office • Job satisfaction • Weak / strong situation • Constraints of office layout • Structure • Gender mix

3.2.6.2. Finance Office

The case study was carried out for the income office of a finance department, which is part of an academic institution that has more than 2500 employees. The location of academic institution is England, UK. The office is autonomous and functional. An initial interview with the manager of the office confirmed that the office was homogeneous with about (85% – 90%) mechanistic tasks, which made the office representative of a mechanistic polar type. The office is differentiated from the organisation and yet fully integrated using IT system, phone, fax and various coordination modes. The customers of the office were students, conference delegates, sponsors and staff from other support departments, who were spread across the whole organisation. This interview was guided using an interview protocol shown in Appendix (H).

The office is small and consists of ten individuals including the manager (e.g. three females and seven males). The initial interview with the manager indicated how each one of the employees had an area of speciality and was working as part of a sequential flow, which makes the office have more of a sequential interdependence (Thompson 1967). The age range of the employees was between 25 and 55. The interviews were carried out mainly with three senior workers of the office, who were familiar with all the activities of the office, because they had considerable experience in working the office. The office operated eight hours per day. However, the employees had the freedom to work on a flexi basis as long as they achieve their daily goals and targets and accomplish their daily tasks. There was only one manager to the office.

As mentioned earlier, the data was collected in this case study using two sources of data. The first source of data came from interviews and the second was direct observations.

As mentioned earlier, the interviews were semi-structured, face to face and in-depth. Phone calls and emails were used to communicate with the gatekeeper of the office, before starting the interviews with the aim of explaining the study, building rapport as advocated by Easterby-Smith, Thorpe et al. (2002). The

gatekeeper of the office was a senior accountant working in the office. The actual interviews were carried out in almost four weeks on a one to one basis. The interviews were carried out mainly with three senior workers of the office. The interviewees were familiar with all the activities of the office and had considerable experience in the office.

An interview protocol shown in Appendix (G) was used to guide the interviews (Creswell 2003). The first page of the interview protocol contained general information such as the name of the firm, the name of the interviewee and his/her position. The list of questions used were guided and shaped by the aim of the pilot studies, consequently, the questions were mainly related to identifying the underlying themes used by various interviewees to characterise the office and its various management systems. See Appendix (G) for the questions of the interview protocol.

The actual interviews were carried out in a suitable quiet place within the office. Seven interviews were carried out as shown in this case study's database in Appendix (E), which is more than the number of interviews carried out for the first case study. This is because further information had to be collected by three of the employees. The first interview was carried out with the manager to have general understanding of the office in terms of its mechanistic and organic mix of tasks and to identify the right people that are required to be interviewed. Thereafter, six other interviews were carried out with three employees in the office to identify various themes used by them to describe the office. This makes the number of the respondents used to identify the themes three as shown in section 3.2.7. At the beginning of each interview, the aim, duration and the way the information were intended to be used was explained to the interviewees. Also, the option of anonymity was given to all the respondents. The design of the questions of the interview protocol was explained earlier in section 3.2.3. The questions of the interview protocol were mainly open to reflect their qualitative nature. However, the funnel interview concept, which was explained in the earlier case study, was also employed. All interviews were audio-recorded to ensure accurate transcription and unbiased note taking (Easterby-Smith, Thorpe et al. 2002).

The second source of data was direct observations of the office and its management systems. The direct observations started by obtaining permission from the gatekeeper (i.e. a senior consultant in the office) (Neuman 2007) to access the offices and observe it under normal working conditions. Two sessions were carried out as shown in this case study's database in Appendix (E). This allowed the use of triangulation using multiple data sources. It was conducted by sitting in a corner of the office and observing how individuals spend their time as recommended by Sekaran (1992). Non-participant observations (Sekaran 1992), explained in the earlier case study, were also used with the aim of corroborating the evidence from the observations with the evidence from the interviews. The observations were unstructured (Sekaran 1992), because this study was exploratory. However, the observations focused on gathering field notes in three main aspects of the office: 1) Interaction with customers. 2) Physical environment. 3) General atmosphere of the office.

For instance, the staff of the office were observed to help the customers quickly, professional and politely. The layout of office was observed to be open layout with desks and compartment draws located next to each other. The manager was located in a separate office facing the main office, where all other employees were located. The interaction between the employees seemed to be informal however they seemed to be professional with the customers of the office. In addition, it was observed that people interacted for about 10 minutes in an hour period. Each one of them was observed doing their own role, while talking to each other and sending/receiving information. It was observed that there were general rules and procedures agreed on between the employees in handling customer orders such as having a rota between the employees. This rota showed an element of team work, however it was only a partial part of the job, as the main aim of the office was to settle the accounts of the whole organisation by carrying out sequentially arranged tasks with the aid of computer software. Although the employees seemed to be friendly to each other, they generally appeared to be stressed and working under pressure.

Table (3.5) illustrates how the answer of respondent 4 was coded, as well as the basic themes extracted from it.

Code	Quoted from the answer of Respondent 4	Emerging basic themes
Task description	*"... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks"*	Task Sequence, Task Uncertainty, Task Analysability, Task Variety, Task complexity, Thompson's (1967) Interdependence, Task Steps Nature, Mechanistic / Organic

Table (3.6) illustrates the codes used for the three respondents of this case as well as the emerging basic themes extracted from them.

Codes	Emerging Basic Themes
• Specialties • Surroundings description • Change • Customer relationships • Customers of the office • Importance of relationship with manager • Co-workers relationships • Tasks description • Job requirements • Job aim • Outcome requirements • efficiency	• Differentiation / Integration • Coordination • Organic / Mechanistic nature • Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level • Technology systems used • Thompson's (1967) technology type • Shared values • Competing Values Framework (Flexible / focused dimension & External / internal dimension) • Thompson's (1967) interdependence • Task Uncertainty • Management control system/Reward system • Business strategy / organisational effectiveness • Task complexity • History of the office • Job satisfaction • Trust • Weak / strong situation • Constraints of office layout • Structure • Gender mix

The data analysis approach adopted in this case study followed Creswell's method for analysing qualitative data (Creswell 2009). His method, shown in Figure (3.2), was used along with Bryman and Bell's (2007) coding stages. A sample of how the transcripts were coded in this case study is shown in Table (3.5). Table (3.5) also shows an example of how various themes emerged

from the Task Description code, which was used to extract text that is most relevant to the objectives of this study. A summary of all the codes as well as the basic themes emerged from the coded segments of text is presented in Table (3.6).

3.2.6.3. Discussion on the Mechanism used to select Polar Type of Case Studies

Two offices with one exhibiting predominantly organic characteristics and other exhibiting predominantly mechanistic characteristics were chosen to represent two polar types of offices. This was done because mechanistic and organic systems are opposite in nature (Robey, Sales 1994, Courtright, Fairhurst et al. 1989). However, Magnusen states that there are no pure mechanistic or organic offices. There is always a mix between both (Robey 1991, Mullins 2007). This raised the issue of investigating which part of the office is mechanistic and which part is organic. Consequently, an attempt was made, when selecting offices that would represent a mechanistic or an organic system, to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991). Magnusen advocates that a research office has the least percentage of mechanistic tasks (i.e. up to 7% percent mechanistic tasks). Based on this, it was considered that selecting a research office to represent an office that exhibits predominantly organic characteristics was most suitable for the first case study. On the other hand, Magnusen advocates that a finance office tends to have the highest percentage of mechanistic tasks and the least percentage of organic tasks (i.e. up to 36% organic tasks) (Robey 1991). Based on this, it was considered that selecting a finance office to represent an office that exhibits predominantly mechanistic characteristics was most suitable for the second case study. However, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office was interviewed to indicate what part is organic and what part is mechanistic.

For instance, after talking to the manager of the finance office, he indicated that the office is exhibiting mainly mechanistic characteristics (i.e. 85%-90% mechanistic). Therefore, various strategies had to be developed to cope with

this mix while interviewing various respondents and during later stages of this research (i.e. the model testing phase). The existence of (10%-15%) organic tasks within an office that is exhibiting predominantly mechanistic characteristics confirmed the opportunity of designing the various task activities of the office based on Magnusen view. This raised the issue of investigating strategies to cope with the effect of this mix on the interdependence types and the uncertainty levels, which are more likely to influence the design process of the various task activities of the office. Similarly, after talking to one of the supervisors of the research office, he indicated that the office is exhibiting mainly organic characteristics (i.e. 95% organic). Therefore, various strategies had to be developed to cope with this mix while interviewing various respondents. The existence of (5%) mechanistic tasks within an office exhibiting predominantly organic characteristics confirmed the opportunity of designing the various task activities of the office based on Magnusen view (Robey 1991, Mullins 2007).

The manager of each office was asked to classify their tasks in terms of two parts: 1) Part (A) tasks, which are repetitive, routine, predictable and simple tasks with low variety and have a nature of a flow. 2) Part (B) tasks, which are complex, non-routine, knowledge intensive, unpredictable tasks with high variety and requires skilful employees. For example, the manager of the finance office described the majority of the tasks of the office to be mechanic. He stated the following:

"… very standard … there are an awful lot of repetitive tasks in a finance office definitely… Part A repetitive processes in most offices is a high 85 to 90 percent hmm again for most administration based offices I would say that that is very standard to be honest because the administrators are there to perform hmm routine task that need doing on a daily monthly or quarterly basis especially in finance, because of financial regulations SSAP's (Statutory accounting practices) FRS's (Financial reporting standards) there are rules and regulations laid down by the financial governing bodies, financial regulatory bodies … so from a finance side a very very high percentage of repetitive tasks… Very predictable to be honest... cash collection as well,

which is part (A)… hmm… We do statutory accounting stuff for month and year end which are reconciliations of accounts. So it's a standard thing obviously a financial body will produce accounts either monthly, quarterly, definitely annually because you have to. So there are certain daily things that we do invoicing and cash receipting, there are monthly things that we do which are reconciliations of accounts. They're basically to make sure that hmm we've account for everything correctly, nothings gone missing and for tax purposes obviously."

Source: Answer of the manager of the finance office on 2/6/2005 – See Appendix (E).

The manager also described that there was (10%-15%) organic tasks within the finance office, which predominantly exhibited mechanistic characteristics. He stated the following:

"… effectively I do them all … we're using a new financial software package …we've been using it for 3 years now and there are still some problems with it … we do annual stuff… first term billing for example accounts, actually getting the debts onto the students accounts parking permits, anything new that's come up. Perfect example is parking permits, historically parking permits were paid to the security desk down on the front, we now bill students for parking permits so any changes to procedures fall into that 10 percent… if the council decide they want to change the way we do something it ends upon my desk for me to sort out."

Source: Answer of the manager of the finance office on 2/6/2005 – See Appendix (E

The manager of the research office described that 95% of the tasks of the office were organic. He stated the following:

"… The majority of the tasks of the office… I would say 95% are part (B)… because the work is essentially research… it is highly complex, unpredictable and requires intensive learning…"

Source: Answer of the supervisor of the research office on 5/5/2005 – See Appendix (D).

The manager of the research office described that there were 5% mechanistic tasks within the research office, which predominantly exhibited organic characteristics. He stated the following:

"These routine tasks are tailored by the rules and regulations of the department"

Source: Answer of the supervisor of the research office on 5/5/2005 – See Appendix (D).

3.2.7   Cross-Case Analysis

The cases of this pilot study phase were presented individually, earlier in this chapter. This section is related to understanding cross-case patterns as well as any patterns which emerged in one office type but not the other to search for differences and similarities between the two categories (i.e. between the two polar case studies) (Eisenhardt 1989, Yin 2003, Voss, Tsikriktsis et al. 2002, Miles, Huberman 1994). This comparison was also done in terms of two levels:

Table (3.7) illustrates a summary of the cross-case comparison between the characteristics of the research sites.

Perspective	Research Office	Finance Office
Organisation	Academic institution	Academic institution
Office type	Research office	Finance office
Size	9 employees	10 employees
Polar types of offices	Office exhibiting predominantly organic characteristics	Office exhibiting predominantly mechanistic characteristics
Customers	N/A	Students, Researchers, Staff from other departments and conferences delegates
Initial Driver	Easy access as needed and supportive staff	Easy access as needed, supportive staff and opportunity for mock interviews
Location	Loughborough, UK	Loughborough, UK

1) Comparison in terms of the general characteristics of each pilot study as summarised in Table (3.7).

2) The use of pattern matching logic, which is a logic that compares an empirically based pattern with various predicted patterns (Yin 2003). Consequently, this means that the findings of the pilot studies (i.e. basic themes emerged from answers of various respondents of each case study) are going to be compared against the findings of the literature review (i.e. variables that are considered to help the analyst to better understand and analyse offices), as shown in Tables (3.8) and (3.9).

Each level was presented in the form of a table, because tabular format is effective in building evidence for constructs (Miles, Huberman 1984).

The list of variables identified from the literature review were tested and refined against the empirical findings of the pilot studies. Table (3.8) illustrates a list of the variables, which were identified from the literature review. In addition, the frequency of the emergence of each basic theme from the answer of each of the respondents was listed as advocated by Miles and Huberman (1984). The ($\sqrt{}$) sign was used to indicate whether the variable predicted from the literature review was visible to any of the respondents in each case study or not. Table (3.8) shows how most of the variables, predicted from the literature review, were also verified from this empirical study.

Table (3.8) illustrates the frequency with each variable, which was extracted from the literature review and emerged from various respondents of the pilot studies.

Variables Extracted from the Literature Review	Respondents of the Organic Case Study*			Respondents of the Mechanistic Case Study*			Variables Extracted from the Literature Review	Respondents of the Organic Case Study*			Respondents of the Mechanistic Case Study*		
	1	2	3	4	5	6		1	2	3	4	5	6
Technology system	√		√	√	√	√	Skill set		√	√	√	√	
Thompson's interdependence	√		√	√	√	√	Stakeholders' expectations	√	√		√	√	√
Leadership style	√		√	√		√	Task complexity	√	√	√	√		
Centralisation / decentralisation	√		√	√			Shared limited resources			√	√	√	
Discretion	√		√	√			History of the office			√	√	√	
Leader / follower relationship behaviour	√	√		√			Leader/follower task behaviour	√	√	√	√		
Competing Values Framework	√	√	√	√	√	√	Follower readiness / maturity level	√	√		√		
Business strategy	√		√		√		Coordination	√	√	√	√	√	√
Organisational effectiveness	√	√	√		√		Management control system	√		√	√	√	√
Task analysability		√	√	√			Integration	√	√		√	√	√
Risk	√		√		√	√	Reward system	√	√	√	√		
Task uncertainty	√	√	√	√		√	Trust				√		
Thompson's technology	√	√	√	√	√		Formalisation and standardisation	√			√	√	
Formal / informal	√				√		Differentiation				√		
Financial restrictions	√				√		Mechanistic / organic	√	√	√	√		
Job satisfaction	√			√			Size				√		
Malone's dependencies	√		√	√	√	√	Managing goals, tasks and subtasks	√	√	√	√		
Pressure				√			Creativity	√	√	√			
Flexible / focused dimension	√	√	√	√	√		External / Internal dimension	√	√		√		
Task variety	√		√	√			Weak/strong			√	√		
Shared values	√	√	√	√	√	√	Decision support system				√		
Constraints of the office layout							Structure						
Gender mix							Heterogeneity						
Hostility													
Numbers relate to the respondents interviewed in each case study													

3.2.8 Have Pilot Study Results Confirmed Variables Identified from the Literature Review

Table (3.8) illustrates how the literature review findings were clearly confirmed as most of the variables identified from the literature were visible to the respondents of the pilot studies.

For example, variables such as technology system, Thompson's (1967) technology all the way until you reach to Decision Support Systems were commonly identified from literature review and pilot studies. However, other variables were only visible to the respondents of the organic case but not to the respondents of the mechanistic case and vice versa, this is considered to be related to the nature and aims of each office. For instance, creativity was visible to three respondents of the organic office, because the office is a research office, where creativity and novelty are a major concern. However, it would be reasonable to think that creativity in a finance office that follows predefined routine procedures would be irrelevant.

In addition, this table also shows how some variables such as constraints of the office layout, structure and gender mix were not visible to any of the respondents of both case studies. However, when cross case analysis was carried out for the field notes of the direct observations of each case study, these variables clearly and commonly emerged.

The challenge in identifying some variables in these pilot studies was related to the fact that they were not visible to the respondents such as hostility and heterogeneity. However, those two variables received attention from an author on the subject of characterising organisations (Miller, Friesen 1984). The challenge in identifying these variables is considered to be related to their inapplicability to the nature of the offices used in this pilot study phase. Consequently, these variables were still considered within the list of variables that can help the analyst to better understand offices and their design. Furthermore, this does not suggest that these variables are insignificant to the aim of this study or that they will be disregarded. However, the relevance of these variables to office design is going to be further investigated within the testing chapter of this study by selecting cases of industrial offices. Because these variables are predicted to have the tendency to be related to offices that are industrial. This means that it will be more accurate to judge during the model testing phase, if hostility and heterogeneity should be included or excluded in the redesign or diagnosis of offices.

On the other hand, both the frequency of the variable and the fact that some of them were visible to the respondents of one office type and not the other, were not considered as factors for qualifying or disqualifying any of the variables. Because, the main aim of the pilot study was to test and refine the list of variables, which was identified from the literature review rather than to disqualify any.

3.2.9 New Variables Identified from Pilot Studies

Table (3.9) shows how five new variables were empirically identified from answers of various employees. These variables were not identified from the initial literature review search, which was presented in Chapter 2. However, the empirical identification of these variables from the pilot studies stimulated the idea of going back to further literature to investigate if any author has directly or indirectly mentioned any of these variables.

Table (3.9) illustrates the list of new variables which emerged empirically from the pilot studies analyses.

Variables identified from Themes emerged from the respondents' answers & were not initially predicted from the review of the Literature	Respondents of the Organic Case study*			Respondents of the Mechanistic case study*		
	1	2	3	4	5	6
Task steps nature	√	√	√	√	√	
Task sequence				√	√	
Manner of working	√		√	√	√	√
Simultaneous tasks			√		√	√
Feedback driven	√	√	√	√		
Numbers relate to the respondents interviewed in each case study						

Although the new variables shown in Table (3.9) were not visible to the researcher while carrying out the initial literature review search, they were indirectly discussed by various authors on the subject such as Robey (1991), Robey and Sales (1994) and Huczynski and Buchanan (2007) as they were describing various types of Thompson's (1967) interdependences and technologies. These new variables were discussed in cited literature as shown below:

3.2.9.1. Manner of working

The working definition of this variable was inferred by the work of authors on the subject such as Robey and Sales (1994) and Huczynski and Buchanan (2007). It describes the way people work in the office, as various types of Thompson's (1967) technologies and interdependences impose different manners of working as shown below:

a) Mediating technology tends to create pooled interdependence, where individuals, groups, and/or departments working independently of each other to contribute to the product or service of the company (Huczynski, Buchanan 2007).

b) Long-Linked technology tends to create sequential interdependence, where individuals, groups and/or departments work sequentially to make contribution to a single project or service of the company (Robey, Sales 1994).

c) Intensive technology tends to create reciprocal or team interdependence depending on the number of units as well as the time lapse the work reciprocates between (Robey, Sales 1994, Huczynski, Buchanan 2007). However, it is usually when the work is carried out by any selected combination of individuals, groups and/or departments (Robey, Sales 1994).

3.2.9.2. Task steps nature

The working definition of this variable was inferred by the work of authors on the subject such as Robey and Sales (1994) and Huczynski and Buchanan (2007). It describes how the nature of the tasks of various technology types can vary in terms of being tasks with or without a predetermined order (Huczynski, Buchanan 2007) as shown below:

a) Mediating technology involves tasks that are highly standardised (Robey, Sales 1994).

b) Long-Linked technology involves tasks which are performed in a predetermined order (Huczynski, Buchanan 2007).

c) Intensive technology involves tasks with no predetermined order (Huczynski, Buchanan 2007).

3.2.9.3. Task sequence

The working definition of this variable was inferred by the work of Robey and Sales (1994), it describes a condition when tasks are sequentially arranged, as various types of Thompson's (1967) technologies and interdependences impose different characteristics of task sequence as shown below:

a) Long-Linked technology tends to create sequential interdependence, which involves a sequence of tasks carried out by several individuals, groups or departments to make a contribution to a single product or service (Huczynski, Buchanan 2007).

b) Intensive technology tends to create reciprocal interdependence between two units, which can be considered as a sequence between two units continuously providing each other with input (Robey, Sales 1994).

3.2.9.4. Feedback driven

The working definition of this variable was inferred by the work of Robey and Sales (1994). It describes a condition where the progress of the tasks is driven by feedback from the object itself. For instance, the selection, combination and order of application of intensive technology are determined by feedback from the object itself (Robey, Sales 1994).

3.2.9.5. Simultaneous tasks

The working definition of this variable was inferred from the work of Huczynski and Buchanan (2007), it describes how the tasks of various types of interdependences may or may not be carried out simultaneously. For instance sequential interdependence has tasks in the sequence that must be performed before the next task is completed (Huczynski, Buchanan 2007).

3.3   <u>Discussion</u>

One of the aims for carrying out this pilot study phase was to test the findings of the literature by refining the list of variables needed to help the analyst to better understand offices. The list of the variables needed to characterise offices and the (re)design process of their management systems have been finalised in Tables (3.8 and 3.9). This is considered to have answered Research Question 1 of this research project:

- **<u>Research Question 1:</u> What is the list of variables needed to characterise offices and the design of its various management systems?**

It is worthwhile noting that two carefully chosen pilot studies were considered adequate for achieving this aim, because the primary purpose of this pilot study phase was to test the literature review findings, which in return reduced the effect of the pilot study phase and its findings on the model built in this study. However, this is considered to put a case for future work as will be shown Chapter 8.

Two pilot studies were selected cautiously based to represent polar types, which were a finance office exhibiting predominantly mechanistic tasks along with a research office exhibiting predominantly organic tasks. However, Magnusen states that there are no pure mechanistic or organic, there is always a mix between both (Robey 1991). Consequently, an attempt was made, when selecting offices representing a mechanistic or an organic system, to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991) as shown in the discussion of section 3.2.6. However, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office was interviewed to indicate what part is organic and what part is mechanistic. Therefore, various strategies had to be developed to cope with this mix while interviewing various respondents.

Both qualitative data collection and qualitative data analysis were carried out concurrently due to the nature of qualitative data collection and analysis. It

was considered that six in-depth interviews were adequate to identify the themes, when the opinions and views emerging were showing consistent patterns and no new information had emerged by interviewing extra people. In addition, two interviews were carried out at the beginning with the manager of each office as they gave a view about the variation of tasks in the office, which helped in determining the appropriate number of people required to be interviewed. On the other hand, it was considered unnecessary to interview all the workers of the office for the following reasons: 1) The taken sample of the respondents was considered to be representative of the small size of the office in this inductive approach, because Saunders, Lewis et al. (2006) argue that a study of small samples of subjects in an inductive approach could be more appropriate than a study of large number of objects in a deductive approach. 2) This study is not geared towards the welfare or happiness of the employees. 3) One of the aims of the case study is to collect detailed information about the office and its management systems rather than the individuals, which is considered to be adequately achieved by interviewing six employees along with the manager of each office.

It is worthwhile to note that the concept of triangulation using various data sources was utilised in order to reduce the effect of subjectivity and bias in answering the questions by each person, consequently, the answers of the interviewees were corroborated with the observations during the analysis phase. In addition, the cross analysis was carried out for both case studies.

The limitations of these data collection methods were accepted, while being aware of them and attempting to reduce them. The limitations of both interviews and direct observations as data collection methods are explained in detail in section 8.6.

In both pilot studies, although some basic themes that were related to the objectives of this study did not emerge during the interviews, they emerged from the field notes of observations as advocated by Patton (2002). This shows how observations were used to identify themes that were invisible to

the interviewees (Patton 2002). Examples of these themes are constraints of office layout, structure and gender mix.

3.4   <u>Summary</u>

Chapter 2 highlighted a cautious construction of variables from the literature review. This chapter provided empirical evidence emerging from the pilot studies, which aims to refine the list of variables identified from the literature review. This empirical evidence took a tabular format of a list of variables, which characterises offices and their management systems. To produce this list of variables, within case-analysis of two pilot studies exhibiting opposite characteristics was carried out for each. Then cross case analysis to compare the findings from both studies was done to gain more understanding of the nature of offices. The results of this pilot study phase showed how five new variables were identified, which expands on the list identified from the literature review. A discussion of the findings was presented.

The next chapter will also use the results of these pilot studies, to take advantage of the coded data as well as the emerging basic themes, in order to further analyse the qualitative data using thematic network analysis. The aim of this second phase of analysis is to methodically analyse the material to identify organising themes as well as a global theme as advocated by Attride-Stirling (2001). These common organising themes between the two polar case studies are considered to be the main management systems of the office, which can be used to guide the process of redesigning the office. These office management systems are then compared with the management systems used within three organisational design models (e.g. VSM, McKinsey 7-S and Galbraith Star model), which were presented in the literature review in Chapter 2. This was done by using the constituent systems of the VSM, Galbraith Star Model and McKinsey 7-S respectively as a check of the subsystems of the office to determine if they were present. Then these office management systems and the various variables, which are considered to help in the better understanding of offices, are going to be used to build the conceptual model for this research project. The model is going to be built whilst utilising a mind map, which represents the office management systems

as well as the causal relationships between them and other variables identified from the literature review.

4 CHAPTER FOUR: Model Building – Linking Empirical Findings of Pilot Study with Theory

4.1 Introduction

Chapter 3 described empirical evidence emerging from pilot studies of two polar case studies (e.g. one mechanistic and one organic). This evidence aimed to test the findings of the literature review (i.e. Chapter 2). It was in the form of a list of variables, which characterised offices and their management systems as shown in Tables (3.8 and 3.9).

This chapter will further analyse the results of the pilot studies using thematic analysis with the aim of identifying the office management systems, which can be used to guide the design process of offices. This was inspired by the work of Thietart (2001) who advocates that pilot studies can be used to identify fundamental issues that are likely to lead to a stage of 'reconceptualisation' by identifying new hypothesis that will need to be further tested. Consequently, this chapter is going to take advantage of the coded data as well as the emerging basic themes carried out from the previous chapter. As a result of this analysis the subsystems of offices are identified and then the results related to these subsystems are compared with rival theories as advocated by Yin (2003). This comparison was done by using the constituent systems of three well-established organisational design models (e.g. VSM, Galbraith Star Model and McKinsey 7-S) as a check of the subsystems of the office to determine if they were present. The conceptual model is then built iteratively. Building the model is carried out based on various model building criteria including theoretical assumptions, the identified subsystems of the office as well as the explanatory relationships between them and other variables based on cited literature. Building the model is explained in terms of two of its main features: 1) The feature related to the model being a methodology of implementation. 2) The creation of a new generation of value stream mapping which will be used within the model. A sample example which demonstrates how the methodology of implementation was built is presented. This example explains how the stages of one of the main phases

of the model, which is related to identifying the current state phase of an office, were built. Final versions of the conceptual methodology of implementation as well as the conceptual new version of value stream mapping are presented.

4.2   Emerging Themes – Thematic Analysis Findings

Miles and Huberman (1994) argue that there is not a general method for analysing qualitative data. Creswell defined qualitative data analysis as an approach that depends on the researcher's innovation and assessment in producing descriptions and/or patterns to capture a research area of interest (Creswell 2004).

Yin advocates the use of general strategies while analysing case studies to proceed without difficulties (Yin 2003, Yin 2009). The first strategy used in this pilot study phase was to depend on the theoretical proposition (Yin 2003), which led to the study (i.e. the identification of main themes that characterise offices and their management systems). The second strategy, which works with the other strategy, is to examine rival explanations from rival theories (Yin 2000).

Furthermore, Eisenhardt (1989) advocates that multiple case study design should be analysed in two levels, the first is within case analysis and the second is cross case analysis to search for cross-case patterns.

In this study, the first part of the analysis focused on the within case analysis. As mentioned in Chapter 3, the qualitative data of this pilot study phase were collected through interviews and direct observations. Thematic analysis, recommended by Attride-Stirling (2001) and Taylor and Bogdan (1984), was found to be suitable for analysing the qualitative data, because, it is an inductive strategy that aims to produce themes/patterns from the data (Patton 2002). Consequently, the transcripts of the interviews as well as the field notes of the observations were analysed simultaneously and then linked together during the analysis to confirm the findings from one data source with another, which is known as triangulation using multiple data collection methods (Eisenhardt 1989, Yin 2009). Then the basic themes produced were clustered into organising themes. Those organising themes are considered to be the basis for leading to a stage of 'reconceptualisation' by

identifying new hypothesis (i.e. model of this study) that will need to be further tested as advocated by Thietart (2001). The thematic analysis approach, also called Grounded Analysis (Easterby-Smith, Thorpe et al. 2002), which was used in this study is explained below, based on the work of Attride-Stirling (2001) and Taylor and Bogdan (1984):

1. The interview transcripts of this study were revised with the research objectives of this study in mind. The aim of this revision was to identify general theoretical areas, which can aid in the creation of a coding scheme or coding framework.

2. The transcripts were revised again carefully to reduce the text by dividing it into meaningful parts. These divided parts of text were given a code (i.e. particular word or topic), which corresponds to a pre-defined criteria.

3. The transcripts were revised to identify codes with common basic themes. This enabled the identification of the connections and the underlying structure as advocated by Attride-Stirling (2001). This also involves clustering the various segments of text around particular themes. In other words it is the clustering of the basic themes around more central themes which will be used for drawing personal interpretations. A theme is the analytic unit used in the comparison of the interviews.

The framework suggested by Bryman and Bell (2007) in order to code qualitative data was found to be congruent with the first two steps of the thematic analysis approach explained above. Consequently, Bryman and Bell's (2007) stages of coding along with the thematic analysis approach were adopted to analyse the qualitative data of each pilot study, as shown in the next sections.

The emerging themes resulting from this analysis were used to draw robust conclusions, which provide insights about understanding offices and their management systems.

4.2.1 Research Office Case Study – Organic Office

As shown in the case study databases of this pilot study in Appendix (D), four interviews and two direct observation sessions were carried out. The administration of these interviews and direct observations was explained in section 3.2.6.The main aim of carrying them out was to identify themes which represented the office and its management systems. A summary of those themes is presented in Appendix (A). Appendix (A) also illustrates how coding was used to segment the transcripts of the interviewees. It also explores the issues discussed by the interviewees which were related to the code. In addition, the basic themes which emerged from those codes and how they were clustered into organising themes are also presented.

4.2.2 Finance Office Case Study – Mechanistic Office

As shown in the case study database of this pilot study in Appendix (E), seven interviews and two direct observation sessions were carried out. The administration of these interviews and direct observations was explained in section 3.2.6. The main aim of carrying them out was to identify themes, which represented the office and its management systems. A summary of those themes is presented in Appendix (B). Appendix (B) illustrates how coding was used to segment the transcripts of the interviews. In addition, it explores the issues discussed by the interviewees, which were related to the code. In addition, the basic themes, which emerged from those codes and how they were clustered into organising themes, are also presented.

4.2.3 Cross Case Study Analysis

This section focuses on the cross case analysis which took place after identifying the patterns resulting from the within case analysis of each individual pilot study. This involved a search for cross-case patterns by analysing each case in relation to another. This was done for few reasons: 1) It strengthens the robustness and quality of the findings (Rowley 2002). 2) It enhances the generalisability of the research findings (Miles, Huberman 1994). 3) It provides further understanding of offices and their nature in relation to mechanistic or organic characteristics.

The data analysis consisted of both a tabular format (e.g. a matrix of categories) and data displays (e.g. mind maps and flow charts), as advocated by Miles and Huberman (1994). Table (4.1) illustrates a summary of the common organising themes, which emerged in each case study, to present and compile the results. This was done to explore the common organising themes which were used to characterise offices and their management systems. In addition, it uncovers the initial underlying patterns in the data and shows how the emerging themes from the individual cases were relatively similar and common.

Table (4.1) shows how the organising theme of each pilot study emerged commonly.

Common Theme	Organising Theme of each Case Studies	
	Organic Research Office	Mechanistic Finance Office
Organising Activities/Actors	Theme One	Theme One
Leadership Style Adopted	Theme Two	Theme Two
Technology Characteristics Needed	Theme Three	Theme Three
Organisational Culture Characteristics	Theme Four	Theme Four
Choice of Work Unit Planning	Theme Five	Theme Five
How to Assess Individuals	Theme Six	Theme Six
Employee Support Needed	Theme Seven	Theme Seven

Furthermore, a summary of the detailed cross-case thematic matrix is shown in Appendix (C). Each one of those common organising themes is further explained, whilst giving examples on how they emerged within the qualitative data of each case study. This is also considered to have answered Research Question 2 of this research project shown in section 2.10.3. The common organising themes are explained below:

4.2.4 Theme 1 – Organising Activities / Actors

This theme elaborates on how activities/actors are organised in the office, how the employees are organised next to each other, how the management of the office is represented and what physical layout of the office looks like. It is related to various variables in the office such as coordination required to manage the

(inter)dependences between the individuals of the office, differentiation and integration, constraints of office layout, structure and whether the office is represented using mechanistic/organic management. This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated how the work is coordinated between individuals in the office such as unscheduled meetings, planning, face-face discussion, mutual adjustments, task decomposition and goal selection, priority order and managerial decisions etc. They also indicated the organic nature of the office such as being small and having high task uncertainty high task variety and low task analysability. In addition, it was observed how the office had a flat structure with various supervisors located in various locations within or outside the organisation, how it is differentiated from the whole organisation and how there were no physical constraints in the office layout. An example of the organic nature of the office was described by one of the respondents and is stated below:

"There is an overall structure, which defines the overall objectives of various tasks, phases, which is the structure of my research, I cannot decide the details of those tasks, because the nature of the job is complex and unpredictable. Sometimes, you can do various tasks at the same time, however most of the time, you can only start one phase and know more detail about after you finish and get feedback from the previous one"

Source: Answer of respondent 3 on 13/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 100% of the respondents indicated how the work is coordinated between individuals in the office such as rules and procedures, scheduling, priority order and first come/first serve etc. They also indicated the mechanistic nature of the office such as being specialised and having low task uncertainty and high task analysability. In addition, it

was observed how the office has a flat structure with one manager located within the organisation, how it is differentiated from the whole organisation and how there were no physical constraints in the office layout. An example the mechanistic nature of the office was described by one of the respondents and is stated below:

"... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.5   Theme 2 – Leadership Style Adopted

This theme represents the leadership style needed by the manager to lead the employees of the office. Various aspects of situational leadership were identified within the basic themes, which emerged from the analysis of the data of each case study. Situational Leadership is used to describe this theme because it is a model that can provide the managers with various alternatives of leadership styles that can be adopted them (Huczynski, Buchanan 2007). In addition, various principles of situational leadership emerged from the answers of the interviews of each case study. This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated how they are being led by their supervisor. The office is organic and decentralised, which requires the manager to give the employees high level of discretion by delegating work to them. An example of the nature of the leadership style of the office was described by one of the respondents and is stated below:

"The main tasks I do are self-directed... I sort of drive the research where I want within broad range of the project description… My main interaction is with supervisor... it's usually about every two weeks... between those, I have sort of unofficial meetings if I need clarifications"

Source: Answer of respondent 1 on 6/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 33.33% of the respondents indicated how they are being led by their manager. The office is mechanistic which requires speed and efficiency, therefore, the manager assign the employees with specialist roles. It was observed that the manager was located in the office to give them help as soon as it is needed to ensure that the office is running effectively. An example of the nature of the leadership style of the office was described by one of the respondents and is stated below:

"We are quite specialist in our areas of expertise…"

"… The people that have certain roles have been here for a while.... so I have been here for fifteen years and there is a lot of long servants in the office and over the years you build your knowledge quite substantially... this is important, because when you have a broad knowledge, then you can answer the questions quite quickly and effectively, and when we have the right knowledge then we can train people well because of the knowledge we have... however, very occasionally the manager may need to help in certain financial areas if we need any…"

Source: Answers of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.6 Theme 3 – Technology Characteristics Needed

This theme aims to represent the characteristics of the technology needed in the office. It is defined in terms of Thompson's (1967) various types of technologies as well as the technology systems used in the office. This theme was described in various ways within the interviews and observations of each case study. It was

clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated the production method used to process their work as well as any technological systems used. The office is organic with high emphasis on learning and creativity, which requires the employees to self learn and be innovative in finding tools and techniques for carrying out their projects. An example of the characteristics of the technology of the office was described by one of the respondents and is stated below:

"I know the overall aim of each work package, as the project is split into work packages, the way we achieve the aim is flexible, variable and feedback dependant with high variety of activities"

Source: Answer of respondent 1 on 6/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 66.67% of the respondents described the production method used to process their output as well as any technological systems used (e.g. financial software). They indicated how each work has a specialist role who works independently, but they also have shared roles in handling customer service, which balances their skills to ensure that the flow of work is always smooth. An example of the characteristics of the technology of the office was described by one of the respondents and is stated below:

"We are quite specialist in our areas of expertise, we got somebody that deals with student fees, somebody that deal with accommodation fees, I deal with direct debt, cashiers, and debt collectors"

"We just had a new finance system installed, which meant major changes to everybody, so we had to change to follow the new procedures of the system…Luckily, our working methods are flexible to move with the time"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.7   Theme 4 – Organisational Culture Characteristics Needed

This theme represents the characteristics of the organisational culture of the office in terms of two main aspects. The first is related to the type of Competing Values Framework (Quinn, Rohrbaugh 1983, Cameron, Quinn 1999) that is suitable for the office. The second related to the organisational strength of the shared values between various employees in the office. This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated the type of Competing Values Framework and the organisational values shared between the people in the office. The office is organic, which has an internal focus and requires a high degree of flexibility. The employees share values such as creativity, novelty, high quality, helping other researchers, focus, self-learning. An example of the characteristics of the culture of the office was described by one of the respondents and is stated below:

"… This means that a researcher in here have to know how each (i.e. many different ways to carry out the objectives) is done and know how to assess them to find out the best option, and in many cases self-learn how it can be done. This make us spend a lot of time by ourselves, go to the library, find books or software and sometimes having to wait to find them..."

Source: Answer of respondent 3 on 13/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 100% of the respondents indicated the type of Competing Values Framework and the organisational values shared between the people in the office. The office is mechanistic, which has a focus on the customer and requires a high degree of focus and efficiency. The employees share values such as flexible work methods, accuracy, speed, professionalism, high level of service, focus, prioritisation, and customer privacy. An example of the characteristics of the culture of the office was described by one of the respondents and is stated below:

"The people that have certain roles have been here for a while.... so I have been here for fifteen years and there is a lot of long servants in the office and over the years you build your knowledge quite substantially... this is important, because when you have a broad knowledge, then you can answer the questions quite quickly and effectively, and when we have the right knowledge then we can train people well because of the knowledge we have... however, very occasionally the manager may need to help in certain financial areas if we need any…"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.8 <u>Theme 5 – Choice of Work Unit Planning</u>

This theme aims to represent the way work units, which are carried out by various employees of the office, are planned. In other words, it relates to identifying how the work is planned as well as scheduled and how the work flows throughout the office. It is characterised in terms of two aspects of the office. The first aspect is the process of identifying the most suitable type of Thompson's (1967) interdependence. The second aspect is related to the degree of predictability in the job (i.e. task uncertainty level). This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated the type of interdependence and the levels of task uncertainty in the office. The office is organic with employees that tend to work very independently, they hardly communicate between each other. On the other hand, the nature of the job is very unpredictable with a high level of task uncertainty. An example of the characteristics of this theme in the office was described by one of the respondents and is stated below:

"My main interaction is with supervisor... it's usually about every two weeks... between those, I have sort of unofficial meetings if I need clarifications"

"The least important I would say constant daily interaction with my supervisor and colleagues, as I have found this to be counterproductive... especially my colleagues, because they research areas that are not related at all"

Source: Answer of respondent 1 on 6/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 66.67% of the respondents indicated the type of interdependence and the levels of task uncertainty in the office. The office is mechanistic with employees that tend to have specialised roles, where they tend to draw from each other's experiences. They also share a rota for handling face-face customer queries, which makes them communicate more to each other to handle them effectively. On the other hand, the overall nature of the job is very predictable with a low level of task uncertainty. An example of the characteristics of this theme in the office was described by two of the respondents and is stated below:

"There is interaction with the students, there are interactions with other departmental staff, and there are interactions with other staff in the office, because we all have different designated tasks in the office"

Source: Answer of respondent 5 on 7/6/2005 – See Appendix (E).

"... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.9   Theme 6 – How to Assess Individuals

This theme aims to represent the way individuals in the office are assessed and monitored in both short and long terms. This assessment and monitoring is carried

out using various ways such as management control systems (MCS), reward systems, business strategy and organisational effectiveness (i.e. organisational goals). This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated how people in the office are assessed in various ways. The office is organic, where the employees are assessed in weekly or biweekly meetings with their supervisors to discuss their progress. In this meeting they can also be either acknowledged or advised with corrections as a weekly/biweekly reward. In addition, the employees have an overall plan with goals and a strategy to achieve them, which can be done with a great deal of flexibility and innovation. When individuals achieve the goals of their final plan, they are rewarded with a certificate. An example of the how individuals are assessed in the office was described by two of the respondents and is stated below:

"I am carrying out my PhD, which I will pass after being able to defend my written thesis report…"

Source: Answer of respondent 1 on 6/5/2005 – See Appendix (D).

"I also ask my supervisor for help during my weekly meetings, which also aims to evaluate my weekly progress and giving me feedback by either acknowledging the work or giving constructive feedback"

"We have weekly targets that must be achieved out of my tasks by producing a piece of writing that could be submitted to my academic supervisor for feedback collection, assessment and revision"

Source: Answer of respondent 3 on 13/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 100% of the respondents indicated how people in the office are assessed in various ways. The

office is mechanistic, where the employees are assessed by the manager individually in terms of various aspects, and based on it they are given feedback. In addition, the employees have a plan with tight deadlines. An example of the how individuals are assessed in the office was described by three of the respondents and is stated below:

"The manager keeps an eye on how everyone is doing, so you will be acknowledged when you do well or work long hours"

Source: Answer of respondent 4 on 30/6/2005 – See Appendix (E).

"As daily reconciliation of cheque, card, we have to balance every day, and every day I have to balance... There is a daily balance and daily reconciliation, which have to be assessed to ensure that is it correct and does not need to be calculated again..."

Source: Answer of respondent 5 on 30/6/2005 – See Appendix (E).

"The manager usually evaluates us in a sort of management driven way, it will be a combination of everything such as our output… the way we behave… etc, then we get given feedback which can either be positive or negative"

Source: Answer of respondent 6 on 30/6/2005 – See Appendix (E).

4.2.10 <u>Theme 7 – Employees' Support Needed</u>

It is a theme of the office which indicates the level or extent of support (i.e. training, help…etc), which needs to be given for various employees in the office to enable them to carry out their jobs. The level of support needed is assessed based on the evaluation of other variables such as job satisfaction, weak or strong task activities, trust, gender mix, history of the office, task complexity, creativity and organic/mechanistic nature. This theme was described in various ways within the interviews and observations of each case study. It was clearly evident how this theme emerged in a similar way in both case studies in the cross-case analysis.

As far as the research office (i.e. organic case study) is concerned, 100% of the respondents indicated the level of task complexity of the tasks of the office. The office is organic, where the employees are supported by their supervisor for issues related to their research. They are also support by the employees of the office in case they need any general research help. An example of the how individuals are supported in the office in relation to other variables was described by two of the respondents.

One of the respondents described the effect of job satisfaction by having participative leadership, as well as the effect of both task complexity, and organic/mechanistic nature. She described this effect with regards to the support given by the manager by stating:

"Because it's a predefined project, you know the research can bring many unexpected results, from this several options present depending on how complex it is, and so the direction you then gonna go is sort of a group consensus with the supervisor having the overriding decision"

Source: Answer of respondent 1 on 6/5/2005 – See Appendix (D).

In addition, another respondent described how the history of the office and creativity may reflect on the degree of support needed in the office by stating:

"…many people have been given the right support to pass their PhD's in this office, and then leaving it… this job is about each one of us carrying out their own original research project as part of being rewarded with a PhD degree."

Source: Answer of respondent 3 on 13/5/2005 – See Appendix (D).

As far as the finance office (i.e. mechanistic case study) is concerned, 33.33% of the respondents indicated how complex the tasks of the office are. The office is mechanistic, where the employees are supported by their manager or employees when needed. An example of how individuals are supported in the office in relation to other variables was described by two of the respondents.

One of the respondents described how trust could reflect on job satisfaction as well as the degree of support needed by stating:

"… if there is any one sick then someone can do their job in their absence, because we know a little bit about each other's jobs and its quite nice to have people who can cover you, because you will feel confident while you are at home sick that your job is going to be done. This makes you feel that you are being supported in a rather personal level, especially that the manager encourages that."

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

In addition, a respondent also specified how the majority of the work is mechanistic with low task complexity, which made her describe her work as a flow. This is considered to indicate on the level of support required, she states:

"... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

Furthermore, a respondent described how the majority of the history of the office reflects on the degree of support offered by other workers in the office, she states:

"The people that have certain roles have been here for a while.... so I have been here for fifteen years and there is a lot of long servants in the office and over the years you build your knowledge quite substantially... this is important, because when you have a broad knowledge, then you can answer the questions quite quickly and effectively, and when we have the right knowledge then we can train people well because of the knowledge we have... however, very occasionally the manager may need to help in certain financial areas if we need any…"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (E).

4.2.11 <u>Summary of Common Themes</u>

A mind map, which represents a summary of all the common themes emerged from the pilot studies, is shown in Figure (4.1). For more information on how the thematic analysis was conducted to extract each of these themes, please see Appendices (A, B and C). This summary also shows the variables, tools and components that can be used to analyse and understand each one of those themes.

Figure (4.1) illustrates mind map of a summary of all common organising themes emerged from the pilot study thematic analysis matrices shown in Appendices (A, B and C).
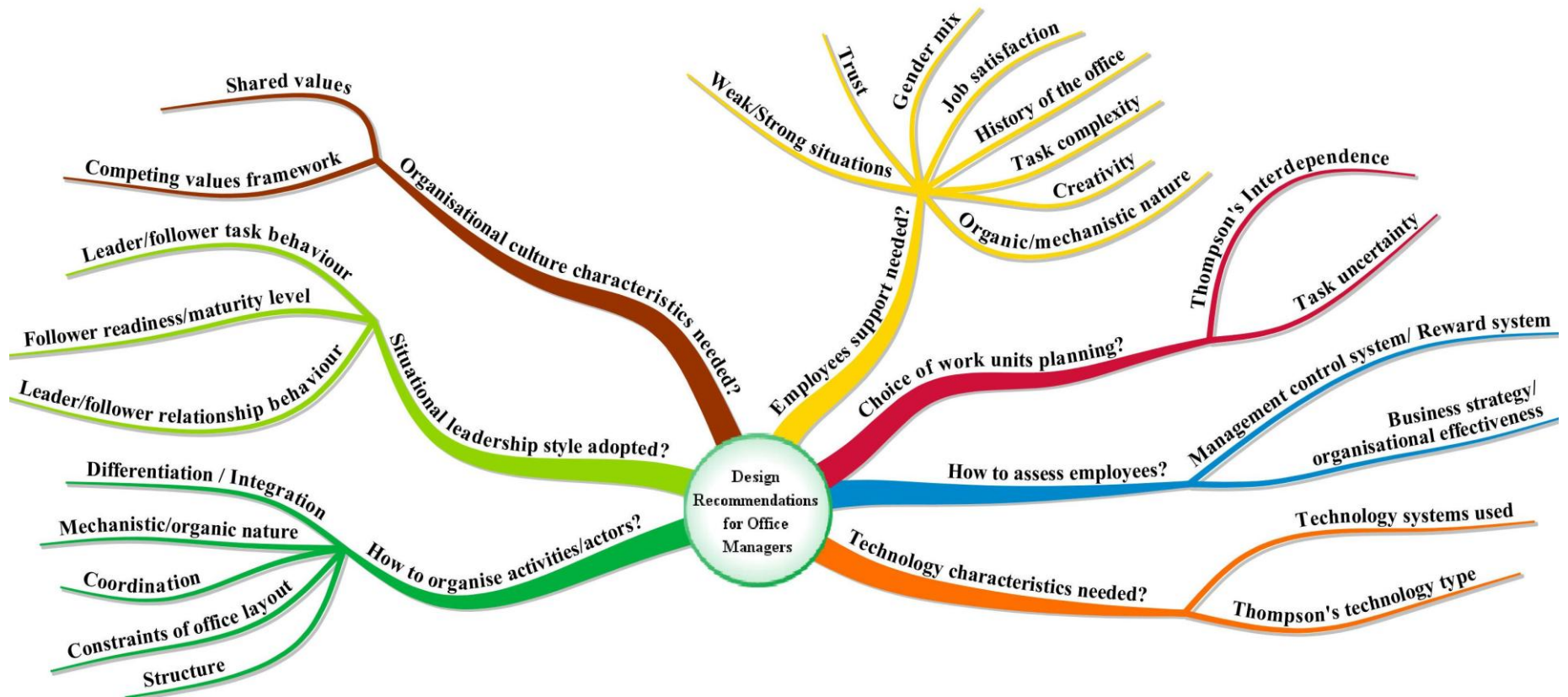
4.3 **Discussion on Basic Themes that were expected to Emerge**

It was expected that basic themes such as value stream mapping, heterogeneity and hostility were expected to emerge from the captured qualitative data of the pilot studies. The non-visibility of each of these variables for the respondents of the pilot studies was justified as shown below:

4.3.1 Value Stream Mapping

Value stream mapping is an influential two-dimensional tool of value stream management, which permits the firm to document, evaluate, and analyse a complex set of relationship as well as plot a course to produce an improved operating strategy and organisational design (Keyte, Locher 2004). It was found that the majority of the respondents were trying to describe their task activities in way that is similar to how value stream mapping would have represented these tasks. An example of how various respondents indirectly tried to describe tasks in a way, which can be represented using a value stream map, is shown below:

"... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks"

Source: Answer of respondent 4 on 3/6/2005 – See Appendix (D).

"There is an overall structure, which defines the overall objectives of various tasks, phases, which is the structure of my research, I cannot decide the details of those tasks, because the nature of the job is complex and unpredictable. Sometimes, you can do various tasks at the same time, however most of the time, you can only start one phase and know more detail about after you finish and get feedback from the previous one"

Source: Answer of respondent 3 on 13/5/2005 – See Appendix (E).

The quoted answer of the respondent of the mechanistic case study uncovers an opportunity for describing the same tasks using the conventional form of value stream mapping. Simultaneously, the quoted answer of the respondent of the organic case study uncovers an opportunity for describing his tasks using a modified or new version of value stream mapping. This indicated the need to develop mechanisms within the new generation of Value Stream Mapping, which can enable the tool to cope with mapping tasks that are complexity, uncertain and variable.

Consequently, this was considered to be an indirect emergence of value stream mapping as a basic theme, because the respondents were perceived to be indirectly trying to describe the tasks in a way that value stream mapping would have done. However, because value stream mapping comes from a lean manufacturing background and is considered to be too technical and specialised for the employees of finance or research offices be aware of. It is worthwhile to note that the researchers of the office did not know much about lean manufacturing or Value Stream Mapping, because they were doing their research in different areas. On the other hand, even if any of them had heard of it, they would more likely to be unaware of its applicability in office domains, or that they might be aware of its limitations within office domains.

This was considered to be a reasonable justification to add value stream mapping as another basic theme that describes and theoretically expands the organising theme of the Choice of Work Unit Planning, as shown in Figure (4.2).

4.3.2 Heterogeneity and Hostility

Heterogeneity is the extent of how variable the markets of the organisation are. In addition, hostility describes how competitive or dynamic the external environment (market) of the organisation is (Miller, Friesen 1984, Myers, Summer et al. 1969). It was observed that each case study neither have variable markets nor have competitors. For instance, the research office is academic and does not provide any services to other industries, whereas the finance office is an internal support office, which aims to settle the accounts of the academic institution and help their

stakeholders in any financial issues. It is concluded that these two variables did not emerge because of their nature and the circumstances the office operated in. It is considered that if a different type of office was tested then they might have emerged from the qualitative data. Consequently, these variables will be considered within the organising theme of Employees' Support Needed due to their theoretical significance, which has been advocated by Miller and Friesen (1984). However, it is worthwhile to note that their relevance to offices rather than organisations will be further investigated within the model testing and validation phase of this research project in Chapters (6 and 7).

In summary, the effect of adding those three variables to the organising themes of the mind map is updated and illustrated in Figure (4.2).

Figure (4.2) shows an updated version of the mind map of the common organising themes after adding 3 basic themes to it. The added variables are shown in block letters and red colour.
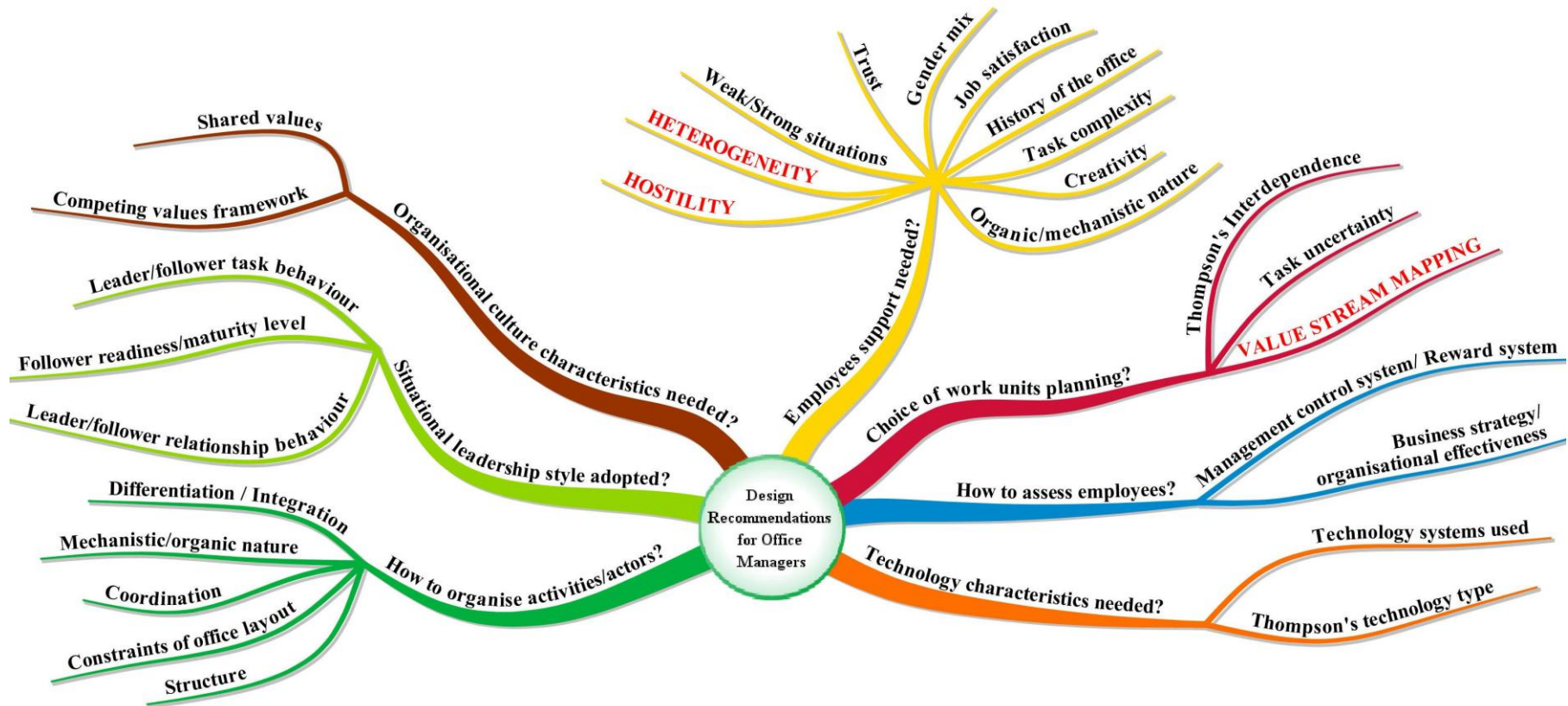
4.4   Comparing the Themes Emerged from Pilot Studies with Rival Theories

As mentioned earlier, the second strategy used within the data analysis of this pilot study phase was to examine rival explanations from rival theories (Yin 2000). Consequently, the seven organising themes, which emerged from the pilot studies, were compared with the subsystems used within three organisational design models (i.e. VSM, McKinsey 7-S and Star Model) explored in Chapter 2. This comparison was done to ensure that the seven organising themes, which emerged from the pilot studies, are representative of offices. Consequently, the constituent systems specified and described in the VSM, Galbraith Star Model and McKinsey 7-S respectively were used as a check of the subsystems of the office to determine if they were present in these actual offices, as shown in Table (4.2).

The results of this analysis by showing how each system of the well-established and well-tested organisational models was present within the organising themes of the office (i.e. office management systems) are illustrated within Table (4.2).

Table (4.2) illustrates how the constituent systems of the VSM, Galbraith Star Model and McKinsey 7-S were respectively used as a check of the subsystems of the office to determine if they were present.

	Components/Systems /Elements of each of the 3 Organisational Models	Description of how each component/system/element of the 3 organisational models exists in the management systems of the model of this study	Check if covered in this model
VSM	System 1	• Organising activities/actors • Technology characteristics needed	√
	System 2	• Choice of work unit planning	√
	System 3	• How to assess individuals – Business strategy/Goals	√
	System 3*	• How to asses individuals – Management Control System/Reward System	√
	System 4	• Competing Values Framework – Flexible/focused dimension • Competing Values Framework – External/Internal dimension • Employees' support needed – Support given to employees to satisfy customer requirements • Situational leadership style adopted.	√
	System 5	• Competing Values Framework • Shared values	√
7-S Model	Structure	• Organising activities/actors – Structure	√
	Strategy	• How to assess individuals – Business strategy/goals	√
	Systems	• How to assess individuals – Management control system/Reward system • Technology characteristics needed	√
	Superordinal Goals	• Shared values	√
	Style/Culture	• Situational leadership style adopted • Competing Values Framework	√
	Staff	• Employees' support needed	√
	Skills	• Competing Values Framework	√
STAR Model	Structure	• Organising activities/actors – Structure	√
	Strategy	• How to assess individuals – Business strategy/goals	√
	Process & Lateral Capabilities	• Choice of work units planning • Technology characteristics needed • Competing Values Framework • Shared values • Organising activities/actors	√
	Reward System	• How to assess individuals – Management control System/Reward system	√
	People Practices	• Employees' support needed • Competing Values Framework • Situation leadership style	√

4.5   Causal Relationships used while Building the Model

This section aims to link the basic themes of each organising theme with the literature review. This is done by illustrating the cause and effect relationships between all the basic themes as well as various variables identified from the literature review of this research inquiry.

A summary of the themes as well as the causal relationships between them and other variables is shown in the mind map of Figure (4.3). Each one of those relationships was justified from the latest literature as shown below:

- The variables that influence coordination mechanisms are interdependence and uncertainty as advocated by Nunez, Giachetti et al. (2009) and van de Ven, Delbecq et al. (1976). If the interdependence and uncertainty change, the type of coordination mechanism utilised changes (Nunez, Giachetti et al. 2009, van de Ven, Delbecq et al. 1976). In addition, task variety and task analysability both influence coordination (McKenna 2006, Robey, Sales 1994, Perrow 1967, Perrow 1971, Nunez, Giachetti et al. 2009).

- Wang argues that Centralisation/Decentralisation and Formalisation/Standardisation are the two vital and fundamental elements, which affect organisation structure and design (Wang 2001).

- A structure is regarded mechanistic based on the degree that it's behaviour is standardised whereas a structure is regarded organic (or adhocratic) when standardisation is absent (Ghani, Jayabalan et al. 2002, Mintzberg 1979). The selection between mechanistic or organic might result from the level of uncertainty (Robey, Sales 1994). It also might depend on task complexity, task analysability and risk (Robey, Sales 1994). In addition, the distinction between a mechanistic system and an organic system is reflected on variables such as reward system, formalisation and standardisation, formal or informal, size skill set, trust and performance measurements (Robey, Sales 1994).

- Thompson's (1967) technology type is influenced by other basic themes such as manor of working, task sequence, task steps nature (Robey, Sales 1994, Huczynski, Buchanan 2007), feedback driven (Robey, Sales 1994), and task complexity (McKenna 2006, Robey, Sales 1994, Thompson 1967, Huczynski, Buchanan 2007). On the other hand, technology systems used are influenced by any requirements related to systems such as decision support systems (Robey, Sales 1994) and financial constraints.

- The choice of the type of Value stream mapping (i.e. new form and conventional form) have been affected by task characteristics such as organic / mechanistic. Section 6.2.5 in Chapter 6 shows how variables related to the characteristics of the stakeholders' expectations and weak / strong tasks were found to be helpful in providing a summary of issues of importance that needs to be addressed while creating the future state of each value stream map. Consequently, the Value Stream Mapping tool is going to be developed following its testing by adding the characteristics of these variables to the map.

- Thompson's (1967) interdependence is influenced by basic themes such as simultaneous tasks, Thompson's (1967) technology, task complexity (Huczynski, Buchanan 2007), task sequence and manner of working (Robey, Sales 1994, Huczynski, Buchanan 2007).

- Weak / Strong situations are influenced by skill set, reward system, task uncertainty and discretion (Mischel 1977). In addition, Creativity is influence by pressure (Amabile, Hadley et al. 2002).

- Shared values are influenced by both the content of the values and the strength in which these values are shared between the people (Schein 1985).

- Competing Values Framework is influenced by two dimensions, which are the flexible/focused dimension and the external/internal dimension (Cameron 2009).

- Situational leadership style adopted is influenced by the direction and support (i.e. task behaviour and relationship behaviour) given by a leader as well as the nature of subordinate staff (i.e. the readiness level of the followers) (Mullins 2007, Huczynski, Buchanan 2007, Hersey, Blanchard et al. 2008).

Figure (4.3) shows a mind map that presents the causal relationships between various variables and basic themes for each of the management systems of the office as suggested from cited literature. The added variables are shown in red colour.
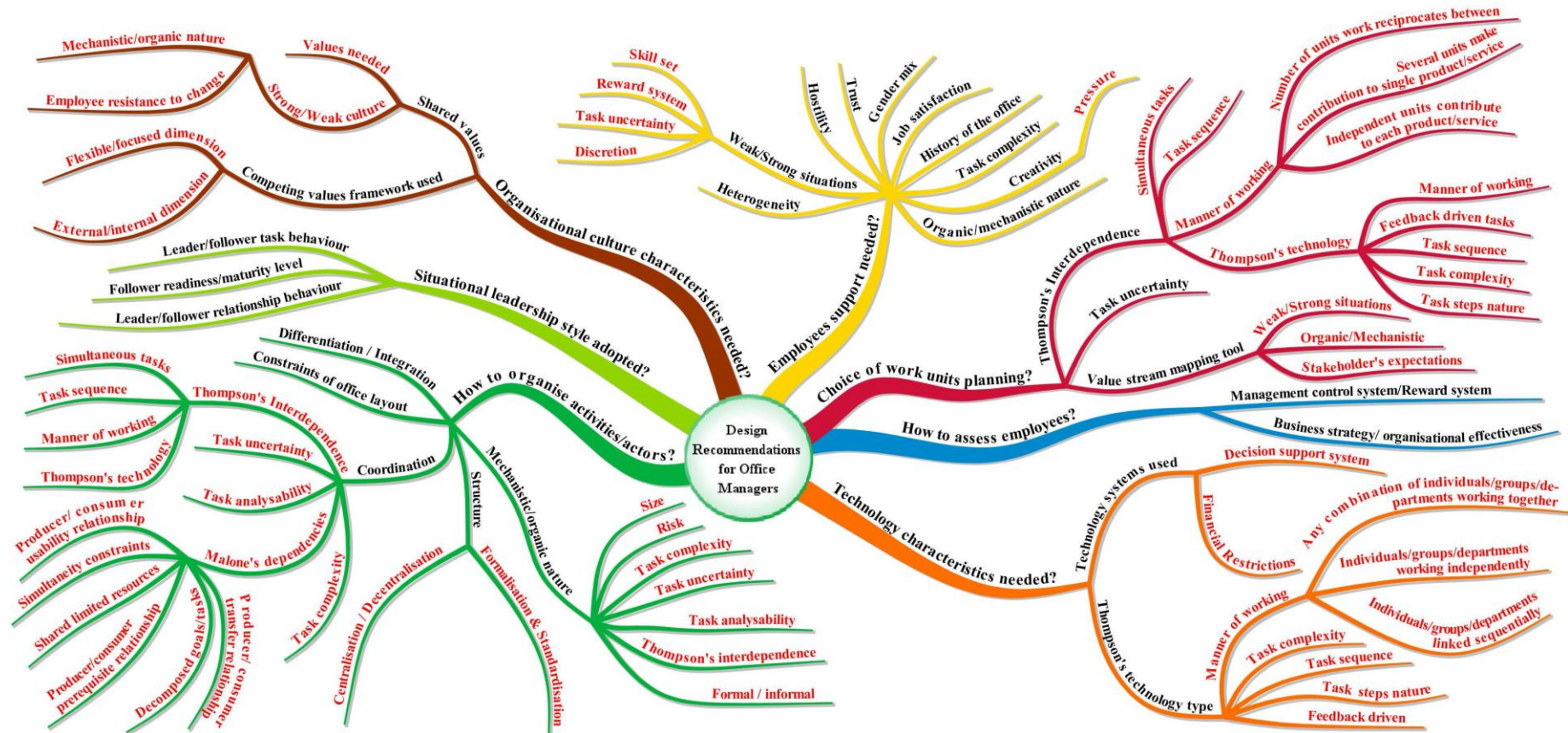
4.6   <u>Building the Model of this Study</u>

The process of building the conceptual model was iterative and time consuming. This section as well as sections 4.7, 4.8 and 4.9 aim to illustrate how the final version of the conceptual model was built. The model was built by following a simple iterative step by step approach. The final version of the conceptual model is presented in two formats: 1) A top up form of the final version of the conceptual model which is shown in Figure (4.8). 2) A detailed form of the final version of the conceptual model which is shown in Figure (4.9). Both forms of the model describe the conceptual model in terms of two different levels of detail. For instance, stages (1-13) presented in Figure (4.9) corresponds to the detailed stages of the current state phase of the model shown in Figure (4.8), whereas stages (14-21) presented in Figure (4.9) corresponds to the detailed stages of the future state phase of the model shown in Figure (4.8).

The process of building the final version of the conceptual model will be explained in this section in terms of the two processes used to build two main features of the model. These two main features are:

A. The model as a set of guidelines in the form of a methodology of implementation for the redesign of offices and their management systems.

B. The use of the Value Stream Mapping tool within these set of guidelines (i.e. the model) to map and redesign the various task activities of an office. This use of the value stream mapping process indicates the need to develop a new version of value stream mapping which can be then used along with the conventional form of value stream mapping to draw the various types of task activities within an office. This new form of value stream mapping will aim to map the organic task activities that are uncertain with low analysability.

The two processes used to build these two main features of the model are explained separately for each feature within sections 4.7, 4.8 and 4.9.

4.7   Building the Model Features – The Methodology of Implementation

The focus in this part of the model building is to identify the features of the model which are related to the construction of a linear set of guidelines. These guidelines are in the form of a methodology of implementation for office design which can be used by managers to redesign the management systems of their offices. A final version of this methodology of implementation is presented in Figure (4.9). However, it is worthwhile to note that this section explains how all stages of the methodology of implementation were built apart from two stages which are related to the use of the value stream mapping tool to draw the task activities of the office (i.e. stages 11 and 18 within the model presented in Figure (4.9)). The process used to build the stages of the methodology of implementation, which are related to the use of Value Stream Mapping (i.e. stages 11 and 18 of Figure (4.9)); will be explained thoroughly in section 4.9.

In order to build the methodology of implementation, it was considered imperative to follow carefully predefined criteria. These building criteria are explained in section 4.7.1.

4.7.1   Criteria Used to build the Methodology of Implementation

These criteria are shown below:

1. The adaptation from the steps involved in the value stream mapping process.

2. The theoretical assumptions needed to build this methodology of implementation. Those theoretical assumptions are explained in more detail in section 4.7.2.

3. The main themes or management systems of the office which were identified from the pilot study phase carried out in Chapter 4 and confirmed by the work of authors on three well-known organisational design models (i.e. Viable System Model developed by Beer S (1985), Galbraith Star Model developed by Galbraith, Downey et al. (2002) and McKinsey 7-S Model developed by Waterman, Peters et al. (1980)).

4. The use of a set of variables and tools related to understanding and analysing offices and their management systems. These variables and tools were initially identified by exploring the literature as shown in section 2.8 and then they were finalised from the results of the pilot study presented in sections 3.2.7 and 3.2.9.

5. The consideration of the causal relationships between the main management systems of the office (i.e. main themes for office design) and the variables which are related to understanding offices. These causal relationships were explained in further detail within section 4.5. They were also summarised and presented in the mind map shown in Figure (4.3). A discussion about the link between this mind map and the variables used within this methodology of implementation is discussed within section 4.7.3.

4.7.2 Theoretical Assumptions

Before the process of building the methodology of implementation starts, the theoretical assumptions required to build its various stages had to be identified. These theoretical assumptions are:

1. Since this study is based on an interpretativist philosophy, Sanders et al state that the role of the interpretativist is to search for understanding the subjective reality of those that they study, by making sense of and understanding the meanings that drives the motives, actions of the research participants they study (Saunders, Lewis et al. 2006). This may also be considered as a subjective approach where social phenomena are described by Saunders et al to be constructed from the perception as well as the resultant action of its actors (Saunders, Lewis et al. 2006).

2. Magnusen advocates that offices are considered to be realistically a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007).

3. Pepper and Spedding (2010) argue that value stream mapping needs to be methodically applied before other tools such as 5S to achieve a truly lean operation. This is considered to provide the opportunity to implement a lean

system (Pepper, Spedding 2010). Value stream mapping is an influential two-dimensional tool of value stream management, which permits the firm to document, evaluate, and analyse a complex set of relationships as well as plot a course to produce an improved operating strategy and organisational design (Keyte, Locher 2004).

4. The Viable System Model is defined by Beer (1985) as a conceptual tool for understanding organisations, diagnosing or redesigning them where appropriate and support the management of change (Espejo, Gill 2002, Thietart 2001, Adams, Haynes 2007). It can ensure the viability of systems proposed (Beer, 1985).

5. Robey and Sales (1994) state that the coordination modes used within sequential and pooled interdependence types are often associated with a mechanistic organisational structures, whereas the coordination modes used within reciprocal and team interdependence types are often associated with an organic organisational structure (Robey, Sales 1994).

6. Robey and Sales (1994) state that the selection between mechanistic or organic might result from the level of uncertainty. They also advocate that it might depend on task complexity, task analysability and risk (Robey, Sales 1994).

7. Robey and Sales (1994) argue that the distinction between a mechanistic system and an organic system is reflected on variables such as reward system, discretion, formalisation and standardisation, formal or informal, size, skill set, trust and performance measurements (Robey, Sales 1994).

8. Mischel (1977) defined Weak / Strong situations based on the characteristics of skill set, reward system, task uncertainty and discretion (Mischel 1977).

9. The work of Lin (2006) which is related to identifying the implication of risk on organic task activities.

4.7.3 The Link between the Causal Mind map and the Variables used within the Conceptual Methodology of Implementation

The mind map presented in Figure (4.3) is a 'content' model that defines the management systems, variables and tools that are important within the effective office. It presents the major management systems of the office that needs to be considered while redesigning an office. It also presents the variables that influence these themes or management systems as well as the variables that can be used to evaluate each one of them. For more information on the variables included within the mind map as well as the causal relationships between them, see section 4.5. It is worthwhile to mention that the mind map shown in Figure (4.3) does not put these variables in any order of importance however it shows the variables that commonly influence various themes or aspects of the office.

This raises the question of how are these variables to be set and modified for an office in order to define the process model of this study, shown in Figure (4.8) and enlarged in Figure (4.9). The answer is that at this early stage of building the methodology of implementation the order of the variable is not considered of great importance because it was attempted to follow the order defined below to tackle the problem of identifying the general logical flow of attacking those variables. This logical order is:

A. What is wanted from the office – strategy?

B. What should the office be doing and what is it doing now?

C. How should the variables be configured to obtain the desirable way of working?

D. Once variables are set, how should the office be managed and led?

E. How is the performance of the office to be maintained?

4.7.4 The identification of the General Structure of the Methodology of Implementation

Before identifying the detailed stages of the methodology of implementation, it was considered logical to identify an overall framework or general structure for the methodology of implementation. This was done by following the first building criterion which is related to adapting the steps of the Value Stream Mapping process. As a result, the main phases of the methodology of implementation were adapted from the three stages of the office Value Stream Mapping tool, which were advocated by work of main authors on the topic such as Tapping and Shuker (2003) and Keyte and Locher (2004). This suggested that the proposed three main phases of the methodology of implementation, shown in Figure (4.4), include: 1) Identifying the current state of the office phase. 2) Identifying the future state of the office phase. 3) Continuous improvements phase. Those three main phases of the methodology of implementation are considered to be the major guiding steps for the redesign of the management systems of an office.

Figure (4.4) illustrates the general structure of the methodology of implementation in terms of its three main phases.
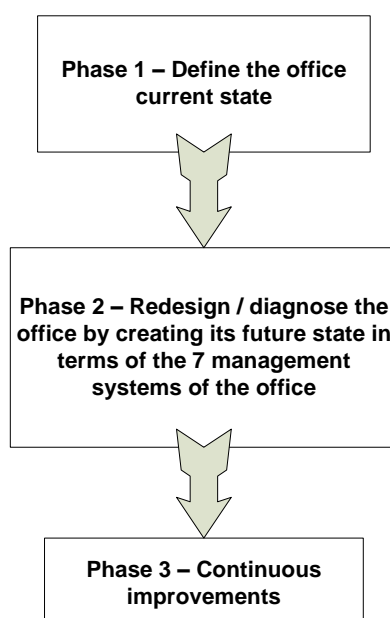
4.8   Actual Building of the Methodology of Implementation

The aim of this section was to decipher the final version of the conceptual form of the methodology of implementation shown in section 4.8.4. This final version was built based on an iterative, logical, well-thought-of and reasonable sequence in terms of its various stages and/or variables evaluated within it. The main concern while building this methodology of implementation was to identify a reasonable flow and sequence that could work for various types of offices without resulting in any major conflicts or sequential errors. This concern was due to the fact that a linear theoretical set of guidelines were found to be suitable for building this methodology of implementation.

Building this methodology of implementation involves the use of a large number of office management systems as well as variables used to evaluate and understand each one of these management systems. Consequently, it was considered that the use of a sample example to explain how this methodology of implementation was built would be adequate. The process used to build the detailed stages of the current state phase of the methodology of implementation was considered to be a good example that can reflect on the process used to build the whole methodology of implementation. This process is explained thoroughly in sections 4.8.1 and 4.8.2. The two sections explain the two steps used to build the current state phase of the methodology of implementation. These two steps are:

1) STEP ONE: The process used to build and identify the main stages of the current state phase of the methodology of implementation which is explained thoroughly within section 4.8.1.

2) STEP TWO: The process used to build and identify the diagnostic stages of the current state phase of the methodology of implementation which is explained thoroughly within section 4.8.2. The introduction of these diagnostic stages within the methodology of implementation is also discussed and justified within section 4.8.2.

It is worthwhile to note that at this early stage of the model development, tolerance in terms of not having the most accurate or correct sequence of stages of the methodology of implementation had to be accepted. This is because: 1) It was not hundred percent clear what would be the best order to deal with the various variables and perhaps it was not sensitive to any ordering. 2) It was hoped that the in-depth studies (i.e. Siemens and Rolls Royce office case studies) would reveal perhaps a better order or alternatively whether this sequence was reasonable as first defined in the flow of the conceptual methodology of implementation presented in Figure (4.9). Although, the process models do not give a clear indication what variables should be dealt with first or which variables set the scene for other variables! It was attempted to maximise the reasoning behind the selection of this ordering or sequencing by following the criteria used to build the methodology of implementation in order to minimise the risk of having errors as a result of the chosen sequence. The two steps used to build the stages of the current state phase of the methodology of implementation are explained next.

4.8.1 STEP ONE: Building the Main Stages of the Current State Phase of the Methodology of Implementation

After identifying the major phases of the methodology of implementation in section 4.7.4, it was considered logical to identify the detailed steps of the first phase of the methodology of implementation (i.e. the phase related to identifying the current state of the office).

The building process used at this step had to rely on the following criteria: A) The theoretical assumptions discussed earlier within section 4.7.2. B) The main themes or management systems of the office. C) The variables used to understand and analyse offices and their management systems while considering the effect of the causal relationships between them (i.e. these causal relationships are summarised in the mind map shown in Figure (4.3)). Building the main stages of the current state phase of the methodology of implementation is explained below:

1) The first theoretical assumption used is related to designing offices in terms of the subjective perception of the manager and the employees of the office. This

subjective approach is going to be considered while populating the various stages of the methodology of implementation as will be shown in Chapter 6. The second theoretical assumption is related to the work of Magnusen who considers that offices are realistically a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007). Magnusen's work is considered in this methodology to be one of the main approaches to analyse an office with the aim of redesigning its task activities. The use of Magnusen's work implies that each of the task activities of the office has to be identified first and then categorised in terms of its tendency to having either mechanistic or organic characteristics. However, the thematic analysis carried out in Chapter 4 resulted in seven office management systems which are more than just task activities when it comes to redesigning an office as a whole. Simultaneously, the identified office management systems were considered to be one of the criteria to be used to build this methodology of implementation. Consequently, it is considered logical and imperative to start this phase by having an initial basic understanding about the general current state of the office and its various management systems before categorising the office tasks in terms of mechanistic or organic characteristics. At the same time, this basic understanding can also help the analyst to start the redesign process while initially accepting the characteristics of those management systems in terms of the variables presented in the mind map of Figure (4.3). For this reason those variables are termed independent variables. They include organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, constraints of office layout, integration, structure, leadership style, organisational effectiveness and business strategy. Consequently, the aim of the first preliminary stage of the current state phase of the methodology of implementation is to identify the characteristics of the independent variables of the office. This step is presented within the first stage of the current state phase of the methodology of implementation shown in Figure (4.5). It is also presented within the first stage of the methodology of implementation shown in Figure (4.9).

An example of these preliminary independent variables, which are identified in this stage, is size. Since the focus in this tool was on the redesign of offices in terms of their task activities, it was considered that the number of employees in the office could be initially accepted at this preliminary stage. However, the required number of the employees can be then reviewed whilst identifying the future state of the office (i.e. in stage (17) of the methodology of implementation presented in Figure (4.9)).

2) After carrying out the preliminary stage of the methodology of implementation, it was considered to be logical to go back and incorporate the second theoretical assumption. This is related to the use of the work of Magnusen (Robey 1991, Mullins 2007) within the methodology of implementation in order to analyse the office. This can be done by categorising each of the office's task activity in terms of its tendency to be mechanistic or organic. This process is presented within the second stage of the current state phase of the methodology of implementation shown in Figure (4.5). However, this categorisation process had to be simplified and broken down into smaller stages, where each is presented within stages (2, 6, 7 and 8) of the methodology of implementation shown in Figure (4.9). Each one of these simplified stages is explained below:

a) The identification of all the office task activities that are carried out within the office. This stimulated the idea of developing a working definition for a "task activity". A task activity is defined in this study as a collection or a group of activities, which are part of the value stream. In this sense, an office is regarded as a collection of task activities that are carried out by its individuals and are part of the value stream of the organisation. Consequently, the step of identifying all the task activities of the office is presented within stage two of the methodology of implementation shown in Figure (4.9).

b) The identification of the type of the task activity in terms of its tendency to being mechanistic or organic. This step is presented within stage six of the methodology of implementation shown in Figure (4.9).

c) The classification of each task activity of the office in terms of mechanistic and organic organisational characteristics. This step is presented within stage seven of the methodology of implementation shown in Figure (4.9).

d) The consideration of the impact of the risk level on each organic task activity of the office. This takes into account the impact of the theoretical assumption related to the work of Lin (2006), which focuses on identifying the implications of risk on the design and nature of organic task activities. Lin (2006) argues that a nuclear power plant or a military organisation, which tends to be a complex organic system that requires high skills, seems to respond to contingencies and high risk scenarios by using a strict operational procedure with rigid rules. This strict procedure tends to be a mechanistic, which is used within the organic system (Lin 2006). This implied that an organic task activity could become mechanistic if the risk level is high. For this reason it was considered logical to introduce the following categorisations: 1) Mechanistic task activities. 2) Organic task activities with low risk. 3) Organic task activities with high risk. This step is presented within stage eight of the methodology of implementation shown in Figure (4.9). Those three categorisations implied that risk plays an important role on the design of a task activity. For this reason it was considered a logical proposition to channel each of those categorisations into two system designs in order to simplify the process of redesigning them. This is further explained in the next stage of the current state phase of the methodology of implementation.

3) It was considered logical to introduce two system designs: A) A mechanistic flow system design for the redesign of both the mechanistic task activities and the organic task activities with high risk. B) An organic system design to redesign task activities that are organic with low risk. This stage combines the effect of both theoretical assumptions imposed by the work of Magnusen (Robey 1991, Mullins 2007) and Lin (2006) on the design of offices. In addition, it provides a foundation for the implementation of the third theoretical assumption related to the use of Value Stream Mapping within this methodology of implementation.

This step is presented within the third stage of the current state phase of the methodology of implementation shown in Figure (4.5). It is also presented within stage nine of the methodology of implementation shown in Figure (4.9).

4) After incorporating the theoretical assumption related to the work of Magnusen within the methodology of implementation, it was considered creative and logical to incorporate the third theoretical assumption within it. The third theoretical assumption, which is based on the work of Keyte, Locher (2004) and Tapping, Shuker (2003), is related to the use of value stream mapping to help the manager along with the employees to redesign each of the task activities of the office. This step is presented within the fourth stage of the current state phase of the methodology of implementation shown in Figure (4.5). It is also presented within stage eleven of the methodology of implementation shown in Figure (4.9). The use of the value stream mapping tool is also considered to provide an opportunity to implement a lean system (Pepper, Spedding 2010). Since Tapping, Shuker (2003) and Keyte, Locher (2004) successfully used the conventional form of value stream mapping to draw office task activities which tend to be mechanistic with certain and analysable tasks, it is considered logical to use this conventional form of value stream mapping within this methodology of implementation to draw the task activities of the mechanistic flow system design. On the other hand, it is considered that a new generation of value stream mapping is needed to be developed within this methodology of implementation to draw the office's organic task activities which are uncertain, unanalysable and complex. For more details on the development of this new generation of value stream mapping within this methodology of implementation, please go to sections 4.9 and 4.10.

Figure (4.5) illustrates the main four stages of the current state phase of the methodology of implementation.
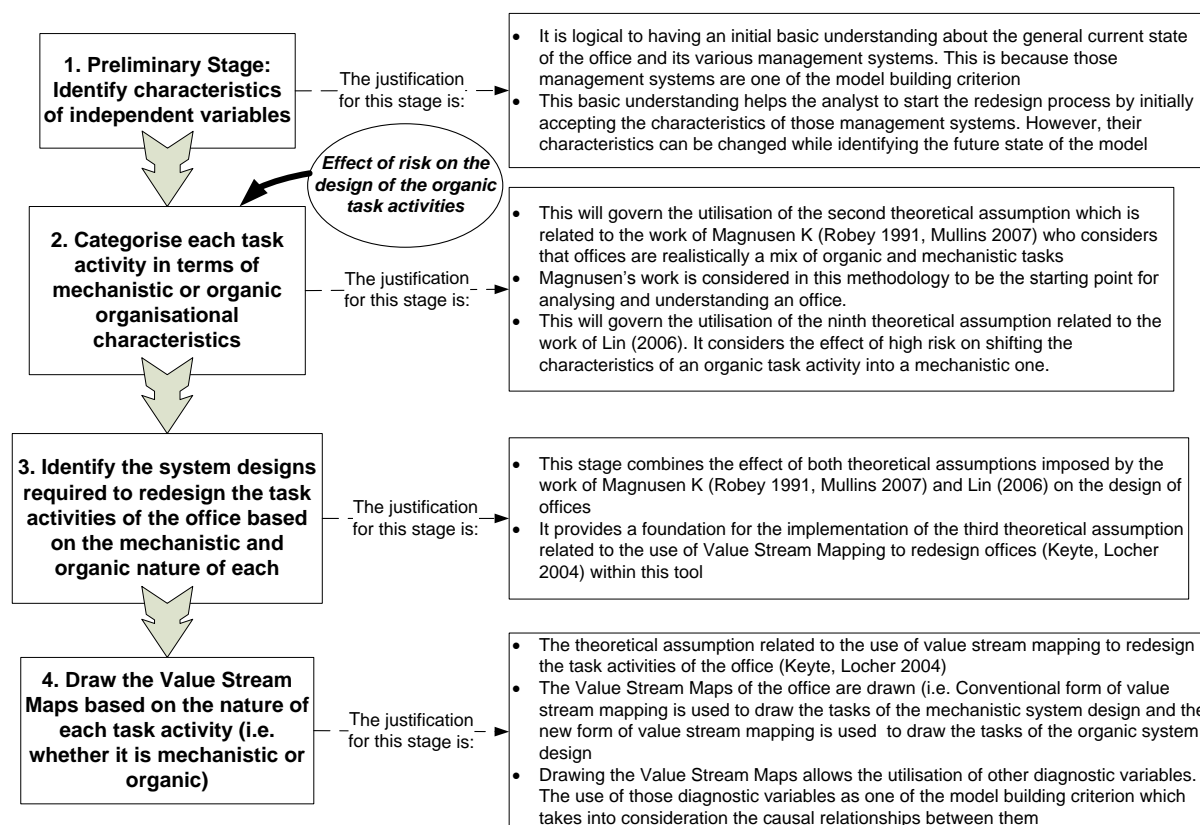
After deciphering the main stages required to identify the current state phase of the methodology of implementation, it was considered necessary to include additional stages, which are diagnostic, to the main stages of the current state phase of the methodology of implementation. The addition of these diagnostic stages, which are presented in the final version of the current state phase of the methodology of implementation shown in Figure (4.6), is considered to provide various advantages to the methodology of implementation. These advantages are:

• To ensure that the criteria used to build the methodology of implementation are going to be incorporated.

• To ensure that various theoretical assumptions are going to be incorporated within the methodology of implementation.

- To inspect if the characteristics of the current state of each task activity, in terms of the variables used to understand and analyse the management systems of offices, are suitable for the future state or needs to be modified.

4.8.2   STEP TWO: Building the Additional Diagnostic Stages used within the Methodology of Implementation

Figure (4.9) illustrates the current state phase of the methodology of implementation which consists of stages (1-13). The number of these stages increased from an initial of seven to thirteen due to the addition of six diagnostic stages. The identification of a suitable location for each of these diagnostic stages was accomplished using the theoretical assumptions, logic and the causal relationships between the variables. These diagnostic stages are presented in terms of two types:

1. Diagnostic stages with an order identified based on logic and the theoretical assumptions. Only one diagnostic stage within the current state phase of the methodology of implementation was of this type as shown in section 4.8.3.

2. Diagnostic stages with an order identified based on the causal relationships between the variables, which were presented in Figure (4.3). Six diagnostic stages within the current state phase of the methodology of implementation were of this type as shown in section 4.8.4. These six diagnostic stages are considered to provide examples of how the causal relationships explained within the mind map shown in Figure (4.3) were used to build the final version of the conceptual methodology of implementation presented in Figures (4.8 and 4.9).

4.8.3   Additional Diagnostic Stages identified within the Methodology of Implementation based on Logic and the Theoretical Assumptions

An example of an additional diagnostic stage with a location identified within the methodology of implementation, shown in Figures (4.8 and 4.9), is presented. It is worthwhile to note that the reasonable location chosen within the model for this diagnostic stage is identified based on logic and the theoretical assumptions presented in section 4.7.2. This additional diagnostic stage is:

- In order to incorporate the fourth theoretical assumption related to the use of the Viable System Model (Beer 1985, Espejo, Gill 2002, Thietart 2001, Adams, Haynes 2007) within this methodology of implementation, the five systems of the Viable System Model are used within the model in the form of an additional diagnostic stage. This stage acts as a check of the office subsystems to verify if they were present within the office current state and if they were operating effectively. This is presented within two additional diagnostic stages of the model as shown in Figure (4.6). The first diagnostic stage is presented within stage 3 of the current state phase of the methodology of implementation shown in Figure (4.9). Also the second diagnostic stage is presented within stage 16 of the future state phase of the methodology of implementation shown in Figure (4.9). The aim of stage 3 is to determine the characteristics of the office current state in terms of a well-tested and well-established organisational design model (i.e. VSM) whereas the aim of stage 16 is to identify if the characteristics of the current state of the office are suitable for the office's future state or require modification. Since this stage does not produce any findings that are to be used as input for other latter stages, then this stage could be performed at any location within the model. However, it was considered more logical to perform this stage immediately following stage two of the methodology of implementation as shown in Figure (4.9). This is because analysis of the office using VSM as early as this may provide important understanding about the various management systems of the office.

4.8.4 Additional Diagnostic Stages identified within the Methodology of Implementation based on the Causal Relationships summarised in the Mind Map

Six of these additional diagnostic stages, with locations identified within the methodology of implementation based on causal relationships, are shown in Figures (4.8 and 4.9). The location and design of these stages is based on the causal relationships which are summarised in the mind map presented in Figure (4.3). Two examples which present how these causal relationships were used within the building of three stages of the model are presented below:

4.8.4.1. Example One

As mentioned earlier, this methodology of implementation was created to take into account the work of Magnusen (Robey, Sales 1994) by designing offices in terms of a mix of organic and mechanistic tasks. This puts an emphasis on ensuring that the categorisation of each task activity in terms of mechanistic and organic characteristics is verified accurately while redesigning an office. When the causal relationships between the identified variables of this study were investigated, Robey and Sales (1994) were found to stress that the selection between mechanistic or organic may result from the level of uncertainty, task complexity and task analysability (Robey, Sales 1994). Robey and Sales (1994) advocate that uncertain and complex tasks with low analysability tend to be organic whereas certain and simple tasks with high analysability tend to be mechanistic. Consequently, it was considered logical to further investigate the characteristics of each task activity by identifying both the level of uncertainty and analysability within each. This resulted in the logical addition of stages four and five immediately following stage three as shown in the methodology of implementation presented in Figure (4.9). This is because: 1) the addition of these two stages following stage two or three is considered to be important to identify if the levels of uncertainty and analysability for each task activity are consistent with the categorisation of the manager with regards to the mechanistic and organic characteristics of each. 2) It is considered to be more reasonable to confirm the consistency between the characteristics of these two variables (i.e. uncertainty and analysability levels) and the organic and mechanistic characteristics of each task activity prior to commencing stage nine of the methodology of implementation shown in Figure (4.9). On the other hand, the following bullet points aim to highlight increased justification for how these two variables were used to inform and identify the location of stages four and five of the methodology of implementation based on the casual relationships between the variables shown in the mind map presented in Figure (4.3). These points are shown below:

1. The mind map presented in Figure (4.3) illustrates the impact of task uncertainty on various themes or management systems of the office. Robey and Sales

(1994) suggested that the selection between mechanistic or organic may result from the level of uncertainty. Simultaneously, it also was considered in this research that variables originating from the outside environment, like task uncertainty, probably should be dealt at an early stage within the methodology of implementation. This consideration was also confirmed by Dill (1958), Duncan (1972), Galbraith (1973), Burns and Stalker (1961), Lawrence and Lorsch (1967) and Thompson (1967) who agree that task uncertainty is a central concept in organisation theory and design. These organisational design theorists sought to understand the interaction of the organisational unit with the environment. However, it is worthwhile to note that other organisational theorists such as Beer (1985) (i.e. who focused on dimensions such as complexity included within stage one of the methodology of implementation) and Galbraith (2002) gave less attention to task uncertainty.

2. The mind map presented in Figure (4.3) illustrates the impact of task analysability on various themes or management systems of the office. Robey and Sales (1994) suggested that the selection between mechanistic or organic might result from the level of analysability. Simultaneously, McKenna (2006), Robey and Sales (1994), Perrow (1967), Perrow (1971) and Nunez, Giachetti et al. (2009) stress the significance of task analysability by emphasising on both its inverse relationship with uncertainty as well as its shared influence along with task variety on coordination. However, it is worthwhile to note that task analysability was given less attention in the topic of designing organisations by other organisational theorists such as Galbraith (2002).

4.8.4.2. Example Two

The criterion used to build the methodology of implementation, which is related to considering the causal relationships between the main management systems of the office and the variables used to understand offices, was incorporated through the addition of a diagnostic stage following stage nine shown in the methodology of implementation presented in Figure (4.9). The aim of this diagnostic stage is to identify if the characteristics of the technology type, the interdependence type and

the coordination modes, which are used within the current state of each task activity, are suitable for the future state or require modification. Stage ten shown in Figure (4.9) starts this process by getting the manager to identify the type of interdependence, technology and coordination used within the current state of each task activity of the office. These characteristics are then reviewed and perhaps modified as needed within stage fifteen which is related to the future state phase of the methodology of implementation. This modification is guided by following the work of Robey and Sales (1994) who state that the coordination modes used within sequential and pooled interdependence types are often associated with a mechanistic organisational structures, whereas the coordination modes used within reciprocal and team interdependence types are often associated with an organic organisational structure (Robey, Sales 1994). These casual relationships implies that the identification of the type of interdependence for each task activity within stage 10, of the current state phase of the methodology of implementation, should be determined following the stage which is concerned with the identification of whether a task needs to follow a mechanistic flow system design or an organic one (i.e. by following stage nine of the methodology of implementation presented in Figure (4.9)). These causal relationships also affected the design of stages ten and fifteen of the model. For instance, the causal relationships between technology, interdependence and coordination, which are advocated by Robey and Sales (1994) and Thompson (1967), promoted the use of interdependence to define both technology and coordination within stage 15 of the future state phase of the methodology of implementation shown in Figure (4.9). This is explained below in terms of the work of Robey and Sales (1994) and Thompson (1967):

1. Intensive technology is used along with reciprocal or team interdependence (Robey, Sales 1994 and Huczynski, Buchanan 2007).

2. Long-linked technology is used along with sequential interdependence (Robey, Sales 1994 and Huczynski, Buchanan 2007).

3. Mediating technologies are used along with pool interdependence (Robey, Sales 1994 and Huczynski, Buchanan 2007).

Figure (4.6) illustrates the main four stages of the current state phase of the methodology of implementation along with the location of the additional diagnostic stages
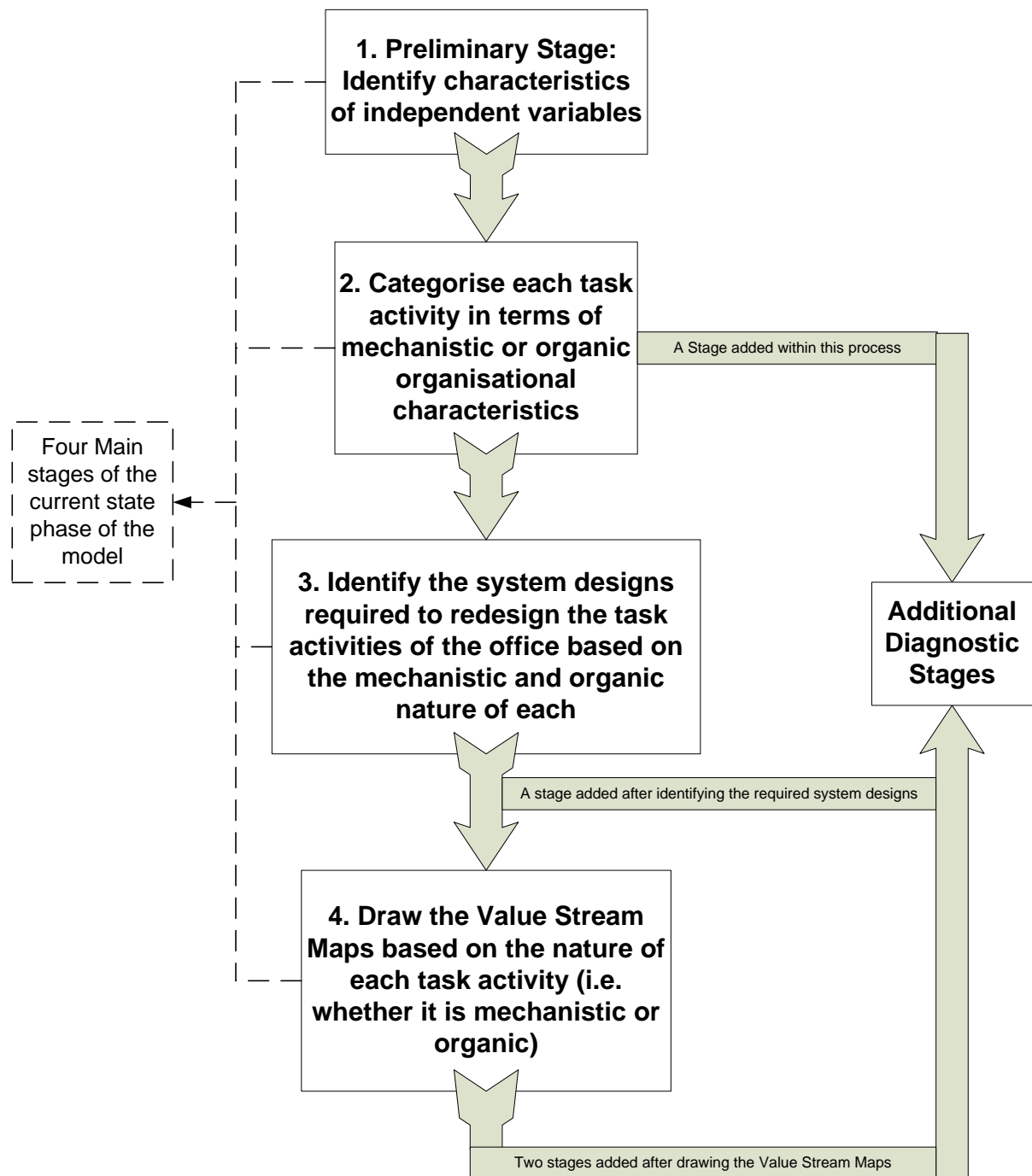
4.8.5 Building the Stages of the Future State Phase of the Methodology of Implementation

Similarly the detailed stages of the future state phase of the methodology of implementation were identified by following the criteria used to build the methodology of implementation (i.e. particularly the theoretical assumptions as well as the causal relationships). The stages of the future state phase of the methodology of implementation are presented in Figure (4.7). In addition, the stages of the future state phase of the methodology of implementation are presented within stages 14-21 in Figure (4.9).

Figure (4.7) illustrates the main three stages of the future state phase of the methodology of implementation along with the location of the additional diagnostic stages involved within it.
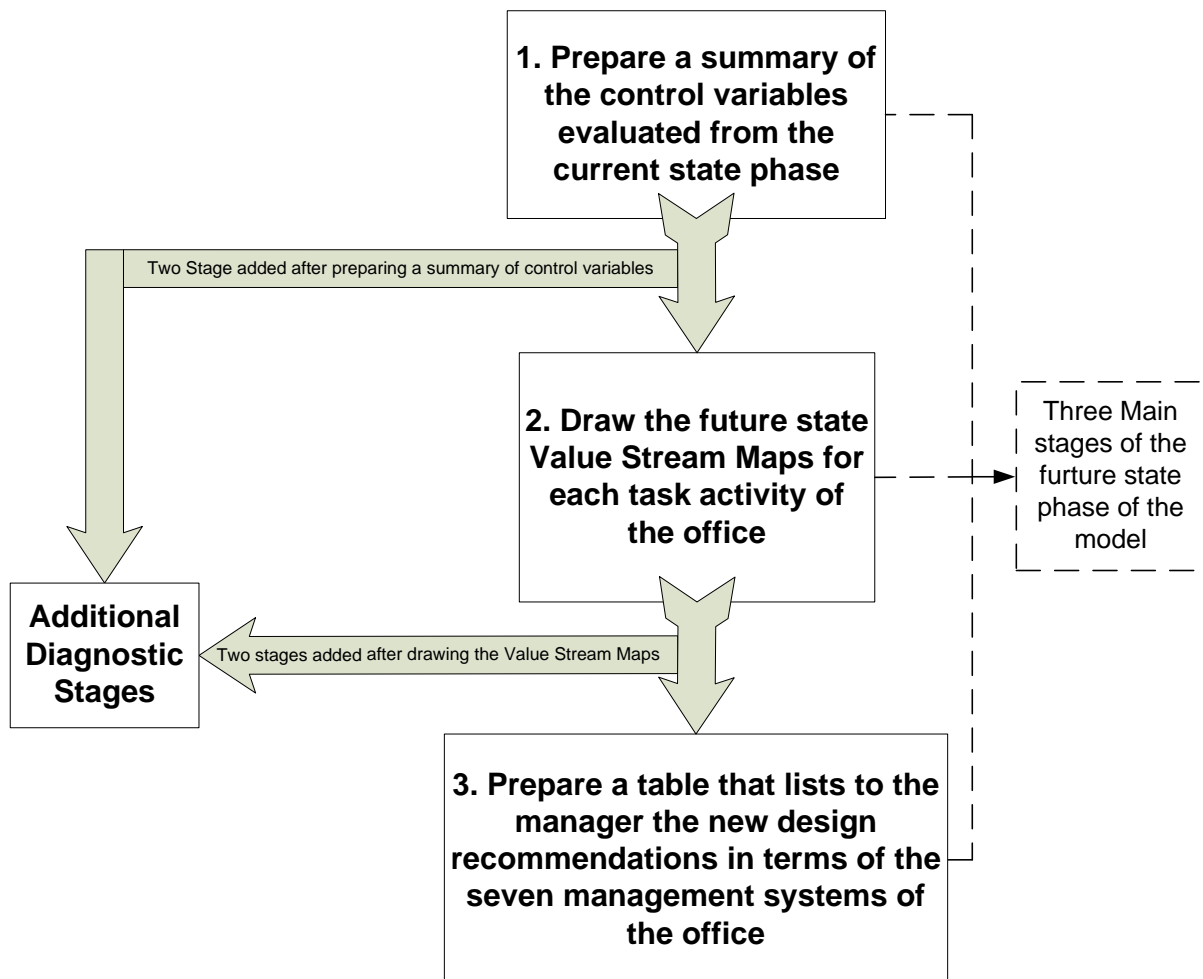
4.8.6 Testing the Flow of the Final Version of the Methodology of Implementation to verify it

In order to maximise the possibility of having the correct order of stages while developing this conceptual methodology of implementation, the researcher attempted to work out if the sequence produced by this building process was more likely to be correct. This was done by thinking of realistic scenarios of offices or environments of different nature. For instance it was attempted to think of applying this model building process into the following environments: 1) A mechanistic office with low risk (e.g. Customer service reception office of an academic institution). 2) A mechanistic office with high risk (e.g. Nuclear Power plant support office). 3) An organic office with low risk (e.g. R&D office). 4) An environment where a group of people adopting an organic system with high risk (e.g. a team of an aeroplane cockpit).

4.8.7 Final version of the Conceptual Methodology of Implementation

Figure (4.8) presents a top up for of the final version of the conceptual methodology of implementation whereas Figure (4.9) presents a detailed version of the final version of it. This final version of the conceptual methodology of implementation was a product of this model building process.

Figure (4.8) shows the top up form of the final version of the conceptual model / methodology of implementation for office redesign.

Figure (4.9) shows the detailed form of the final version of the conceptual model / methodology of implementation for office redesign.

	STAGE 1
Preliminary stage – initial data collection for variables of the current state of the office (e.g. organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, constraints of office layout, integration, structure, task complexity, leadership style, organisational effectiveness and business strategy)	

Identify all the task activities of the office STAGE 2

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively STAGE 3

Evaluate the perceived uncertainty of each task activity STAGE 4

Evaluate the perceived analysability of each task activity STAGE 5

Identify the type of each task activity carried out in the office – mechanistic or organic task activity STAGE 6

Divide each task activity type in terms of mechanistic or organic STAGE 7

Divide each organic task activity in terms of risk level, this may include: 1) Mechanistic task activities. 2) High risk organic task activities. 3) Low risk organic task activities. STAGE 8

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for mechanistic tasks and high risk organic tasks. 2) Organic system design for low risk organic tasks STAGE 9

Define technology, interdependence & coordination for each task activity of each system design STAGE 10

For task activities of mechanistic flow system design

For task activities of organic system design

STAGE 11

Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event

Draw current state maps of these task activities using new form of Value Stream Maps – Team event

STAGE 12

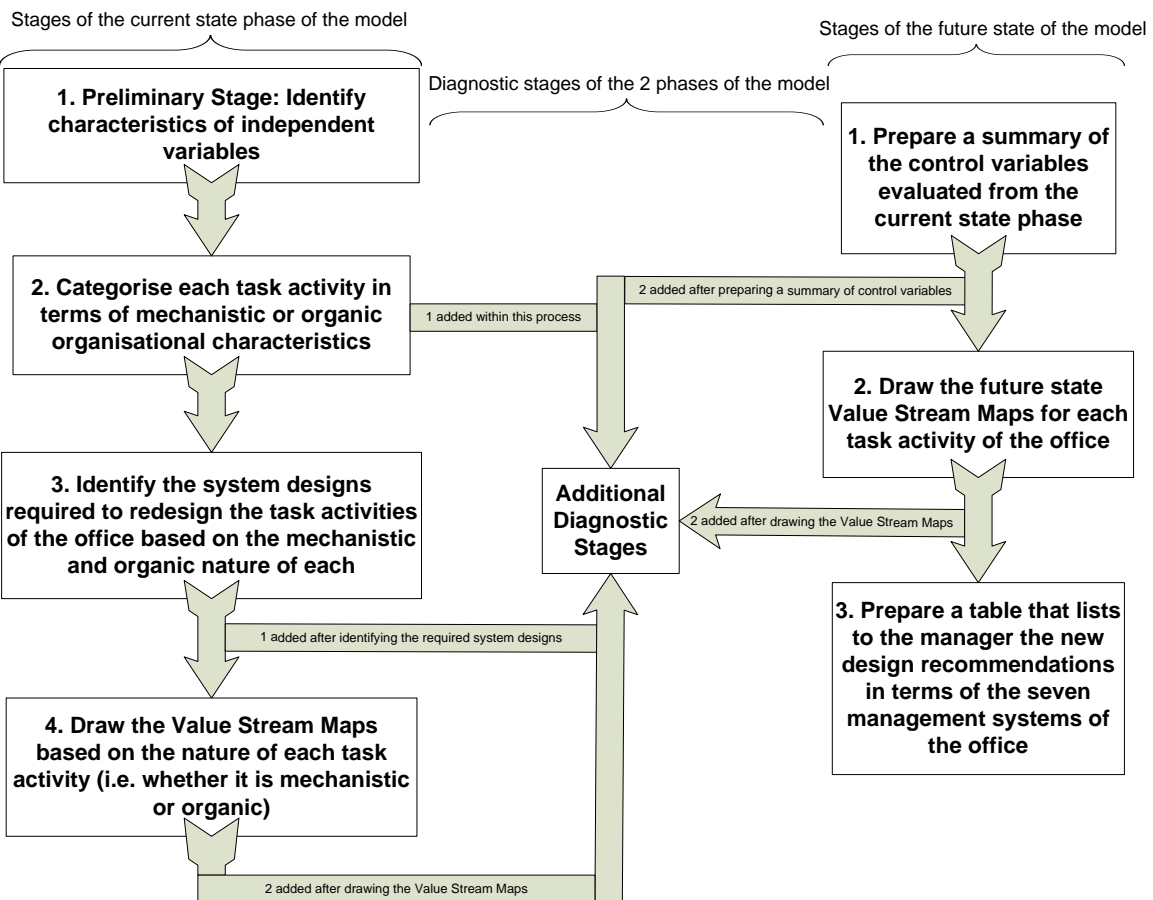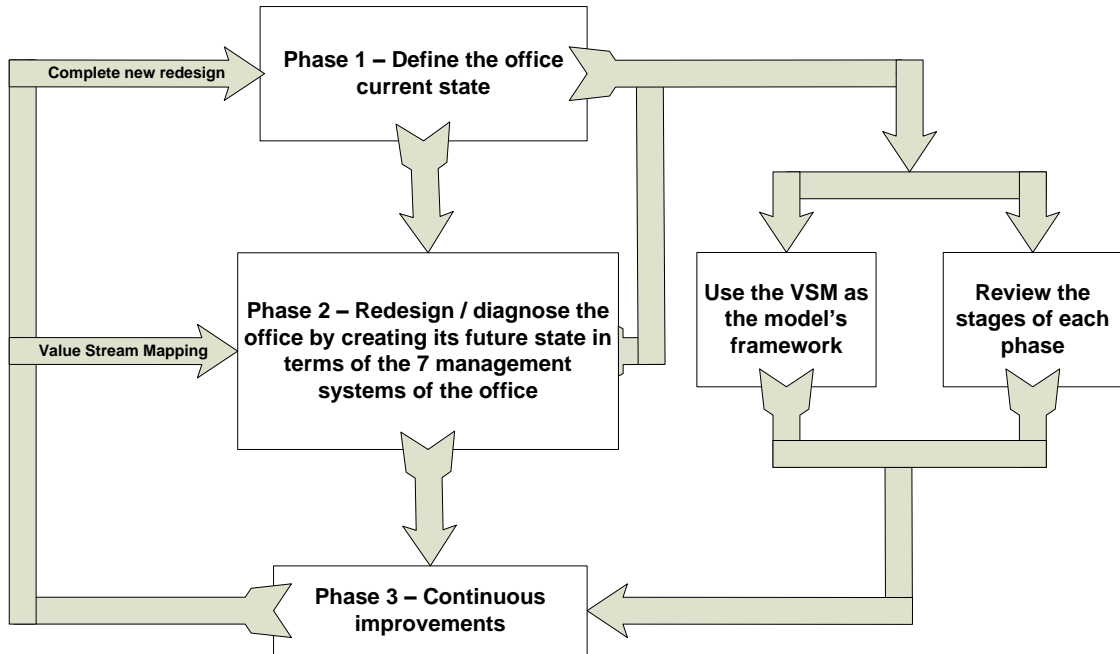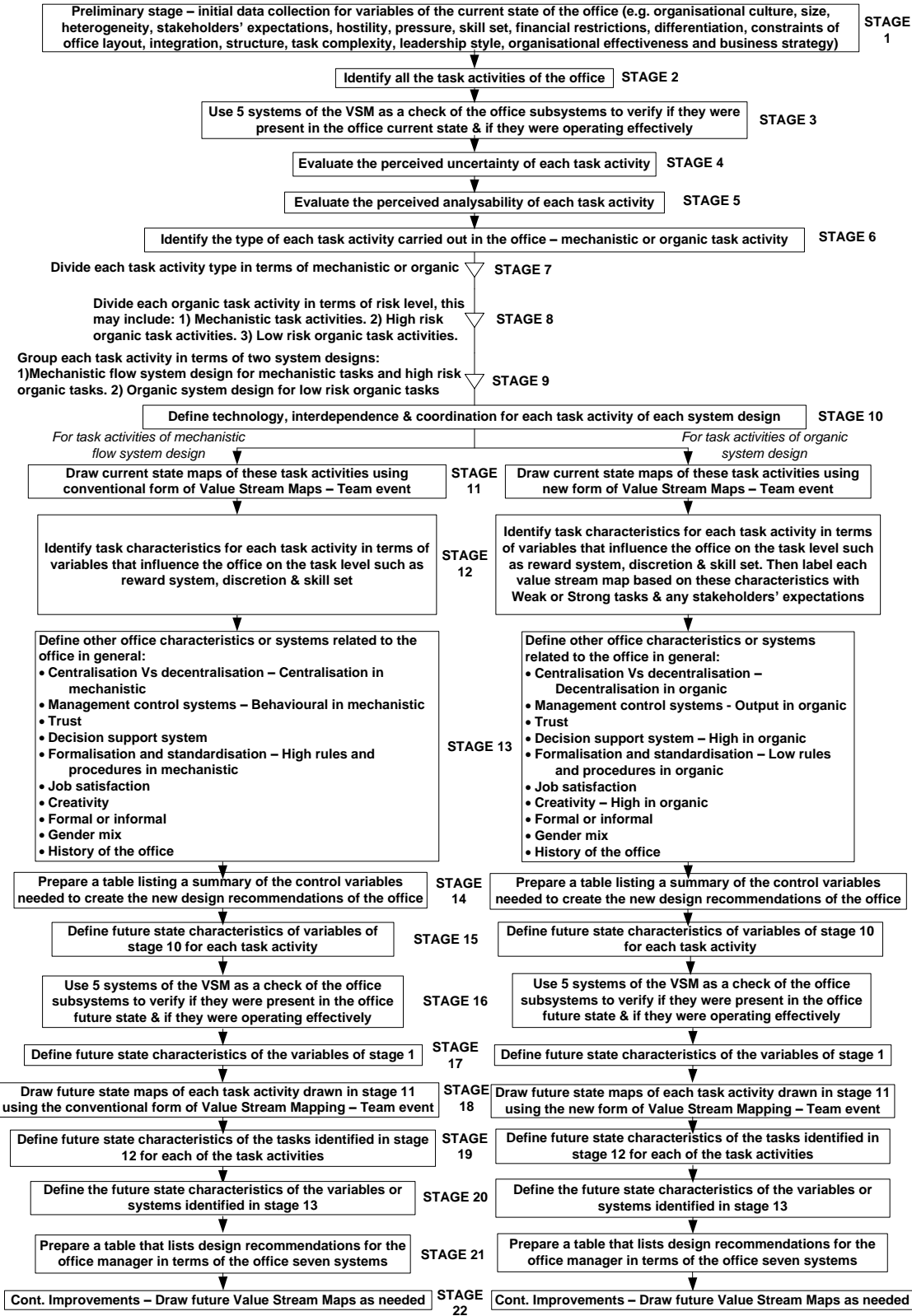**Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set**

Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set. Then label each value stream map based on these characteristics with Weak or Strong tasks & any stakeholders' expectations

STAGE 13

Define other office characteristics or systems related to the office in general:
- **Centralisation Vs decentralisation – Centralisation in mechanistic**
- **Management control systems – Behavioural in mechanistic**
- **Trust**
- **Decision support system**
- **Formalisation and standardisation – High rules and procedures in mechanistic**
- **Job satisfaction**
- **Creativity**
- **Formal or informal**
- **Gender mix**
- **History of the office**

Define other office characteristics or systems related to the office in general:
- **Centralisation Vs decentralisation – Decentralisation in organic**
- **Management control systems - Output in organic**
- **Trust**
- **Decision support system – High in organic**
- **Formalisation and standardisation – Low rules and procedures in organic**
- **Job satisfaction**
- **Creativity – High in organic**
- **Formal or informal**
- **Gender mix**
- **History of the office**

STAGE 14

Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office

Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office

STAGE 15

Define future state characteristics of variables of stage 10 for each task activity

Define future state characteristics of variables of stage 10 for each task activity

STAGE 16

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively

STAGE 17

Define future state characteristics of the variables of stage 1

Define future state characteristics of the variables of stage 1

STAGE 18

Draw future state maps of each task activity drawn in stage 11 using the conventional form of Value Stream Mapping – Team event

Draw future state maps of each task activity drawn in stage 11 using the new form of Value Stream Mapping – Team event

STAGE 19

Define future state characteristics of the tasks identified in stage 12 for each of the task activities

Define future state characteristics of the tasks identified in stage 12 for each of the task activities

STAGE 20

Define the future state characteristics of the variables or systems identified in stage 13

Define the future state characteristics of the variables or systems identified in stage 13

STAGE 21

Prepare a table that lists design recommendations for the office manager in terms of the office seven systems

Prepare a table that lists design recommendations for the office manager in terms of the office seven systems

STAGE 22

Cont. Improvements – Draw future Value Stream Maps as needed

Cont. Improvements – Draw future Value Stream Maps as needed

After developing this methodology of implementation, the following observations that further describe some of its common characteristics were identified by the researcher. These observed characteristics are:

• The current state phase is presented within stages (1-13) of the methodology of implementation shown in Figure (4.9). Figure (4.9) also presents the process of identifying the future state phase of the methodology of implementation using stages (14-21). Since the creation of the future state map of offices using this methodology of implementation is based on the characteristics of certain variables (e.g. task uncertainty, task analysability, task complexity, risk and mechanistic / organic) identified from the current state map of the office, these variables are considered to control the design process of offices. This is why they are called control variables. This suggests that the characteristics of these control variables do not change between the current and future states of an office. Mechanistic and organic are used as control variables because Robey and Sales (1994) state that a task activity is mechanistic or organic based on the levels of task uncertainty, task analysability, task complexity and risk. Although the unchanged characteristics of these control variables are considered to have simplified the methodology of implementation, they may have induced some limitations to it too.

• There are advantages of considering the organic and mechanistic variable as a control one: 1) Mechanistic and organic characteristics are bundles of variables that can be used to help in redesigning the office and create its future state map objectively by following the work of Robey and Sales (1994) and Chethall (2003). Consequently, tables and figures were used to redesign various aspects of a task activity based on whether it is organic or mechanistic (For more details, see Appendices (J and K). 2) Mechanistic and organic are two opposite polar types of organisational systems, which represent a quantum of various types of organisational units with each at one end of the quantum (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007).

• The rest of the variables used within the methodology of implementation were observed to have one characteristic in common. They are all observed to be

defined depending on the characteristics of both the control and the independent variables of the methodology of implementation. Therefore, they are called dependent variables. These variables include: A) Variables related to the characteristics of the method used to produce the output of each task activity shown in Stage 10 in Figure (4.9). B) Variables related to characteristics of the tasks of each task activity shown in Stage 12 in Figure (4.9). C) Variables related to the performance criteria and measurement of the office shown in stage 13 in Figure (4.9). A summary of the various types of variables which were used within the methodology of implementation is shown in Table (4.3).

Table (4.3) shows the classification of the variables used in the methodology of implementation.

Variable classification	Example of variables in each classification
Independent variables	Organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, constraints of office layout, integration, structure, leadership style, organisational effectiveness and business strategy
Control variables	Task complexity, task uncertainty, task analysability, risk, mechanistic or organic
Dependent variables	Technology, interdependence, coordination, reward system, discretion, skill set, weak or strong, centralisation Vs decentralisation, performance appraisals, trust, decision support system, formalisation and standardisation, job satisfaction, creativity, formal or informal, gender mix, history of the office

4.9   Building the Model Features – The New Generation of Value Stream Mapping

The building of the methodology of implementation shown in Figure (4.9) was explained earlier in section 4.7 for all of its stages apart from stages (11 and 18). This section will help in explaining how the value stream mapping process is to be used within stages (11 and 18) of the methodology of implementation shown in Figure (4.9) to redesign the mechanistic and/or organic task activities of the office. The critical review of the literature shown in Chapter 1 strongly indicated that the conventional form of value stream mapping has been successfully used by Tapping and Shuker (2003) and Keyte and Locher (2004) to map office task activities, which

tends to be mechanistic with certain, analysable and simple tasks. Consequently, the conventional form of value stream mapping can be used within stages 11 and 18 of the methodology of implementation shown in Figure (4.9) to map the mechanistic task activities of the office. This also involves the use of various metrics or performance measurements (e.g. time – process time, lead time, and value-added time, typical batch sizes or practices, changeover time, demand rate, percent complete and accurate, number of people, reliability, Inventory, information technology used and/or available time), which were incorporated by Tapping and Shuker (2003) and Keyte and Locher (2004) while mapping the mechanistic task activities of an office.

However, difficulties arose while searching for a tool that can map the organic task activities of the office. This might be due to the little attention which has been given to identifying methods for mapping task activities that are organic with uncertain, unanalysable and complex tasks as discussed earlier in section 2.10.1. Consequently, the aim of this section is to show how the development of a new form of value stream mapping can allow the drawing of office task activities, which tends to be organic with uncertain, unanalysable and complex tasks. This instigated the need to build this part of the methodology of implementation by identifying the required features of the new generation of Value Stream Mapping. However, in order to build this new generation of value stream mapping various theoretical assumptions had to be made. These theoretical assumptions are:

4.9.1 Theoretical Assumptions

1. Magnusen advocates that offices are considered to be realistically a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007).

2. Tapping and Shuker (2003) and Keyte and Locher (2004) used the conventional form of value stream mapping to map the office's mechanistic task activities which tend to be simple and analysable.

3. The lean consumption map was invented by Womack and Jones (2005) to streamline a company's consuming process. It is considered in this tool that the

best way to see opportunities for improvement is by maping the steps in a production and consumption process (Womack, Jones 2005). This is further demonstrated using an example shown in Figure (4.10), which is extracted from the work of Womack and Jones (2005). Womack and Jones (2005) advocate that a map can reveal how broken processes waste the time and money of both the consumers and the providers.

4. Robey and Sales (1994) advocate that organic tasks tend to incorporate performance measurements that are subjective whereas mechanistic tasks tend to incorporate performance measurements that are objective.

4.10   Actual Building of the New Generation of Value Stream Mapping

Since the new generation of value stream mapping is to be used within office domains, the process of building the new generation of value stream mapping started by taking into account the first two theoretical assumptions: 1) The work of Magnusen who advocates that offices are considered to be realistically a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007). Consequently, the aim of creating this new generation of value stream mapping is to map the organic task activities of an office. 2) The work of Tapping and Shuker (2003) and Keyte and Locher (2004) who used the conventional form of value stream mapping to map the office's mechanistic task activities which tend to be simple and analysable. This suggested that the value stream mapping process can be used to map the organic and the mechanistic task activities of an office by the utilisation of both the conventional and new forms of value stream mapping.

After identifying the initial considerations, which needed to be taken, to allow correct use of the new generation of value stream mapping within the methodology of implementation shown in Figure (4.9). It was then considered that the next logical step would be to take into account the third theoretical assumption, which is related to the use of the lean consumption map developed by Womack and Jones (2005), during the building of the new generation of value stream mapping. Consequently, it was considered suitable to use the lean consumption map as an extension to build

the new generation of value stream mapping. An example of the lean consumption map extracted from the work of Womack and Jones (2005) is presented in Figure (4.10).

The overall structure of the new generation of value stream mapping was mainly built by deducing it from the "Lean Consumption Map". It consists of two main parties, the provider and the consumer. It is also considered that the system in focus (i.e. an office that needs to be redesigned) is the provider and the other system is the consumer. The consumer can be an external/internal person, office, department, supplier…etc. It was also adapted from the lean consumption map to draw the interaction between the consumer and provider as the task proceeds from one stage into the next. In addition, the duration required to complete the tasks of each the provider and the consumer are also marked on each side of the map. However in order to equip this new generation of value stream mapping with methods to cope with mapping challenges that the conventional form of value stream mapping failed to do (e.g. mapping organic task activities that are complex and uncertain), it was considered logical to provide the new generation of value stream mapping with additional tools and stages of development. These additional tools and stages of developments are presented below:

1) It was considered advantageous to introduce the concept of a black box (Cuadra, Katter 1967, Skyrme 1999, Bissell 2001) to the new generation of value stream mapping. This was done in order to allow this tool to cope with mapping tasks that are complex, unpredictable and unanalysable. The black box concept is defined as a device, object, or system whose inner workings are unidentified (Cuadra, Katter 1967, Skyrme 1999, Bissell 2001). As far as the organic task activities are concerned, they tend to have complex or analysable tasks whose inner workings (i.e. time and/or details) cannot be identified (Robey, Sales 1994). Consequently, these tasks can be represented using a black box within the map, as shown in Figure (4.11).

2) Unlike the lean consumption map, other new dimensions were creatively added to the conceptual new generation of value stream mapping. These include the

addition of graphical icons to the new form of value stream mapping. The aim of these icons is to further simplify and show more details that may lead to further potential areas of improvements. The nature of the interaction and the type of the technology used between the consumer and the provider for each tasks of a particular task activity are mapped using these icons. For instance, these icons represent whether the interaction was carried out via phone, face to face meeting, internet or ERP system etc as shown in Figure (4.11).

3) It was considered to be easier to read and visually clearer when different colours are used as codes that hold some meaning behind them. For instance, the time needed for each stage is presented in a box with blue coloured text as shown in Figure (4.11). Whereas the box which states the position of the employees who are involved in performing each stage of the map were represented with red coloured text as shown in Figure (4.11).

4) Various graphical icons, symbols and arrows used within this new generation of value stream mapping are explained in the bottom of Figure (4.11). For more information on these icons, see Appendix (I).

The next logical step was to identify the performance measurements (i.e. the metrics) that can be used within the new generation of value stream mapping, which is related to the incorporation of the fourth theoretical assumption. This theoretical assumption is related to the use of subjective performance measurements as metrics for organic task activities as advocated by Robey and Sales (1994). Since the conceptual new generation of value stream mapping is carried out for organic task activities, it is considered that the most suitable type of performance measurements for this new generation of value stream mapping is subjective metrics. On the other hand, it is considered that mapping an organic task activity using this new generation of value stream mapping can provide an opportunity for improving those task activities regardless of the nature of the performance measurements used. For instance this tool, as a visual mapping aid, can provide the employees with insights for potential improvement to the task activity being drawn in terms of various issues: 1) Its activities. 2) Number of people involved. 3) Congruency of tasks with the

objectives. 4) Technology used. 5) Eliminating waste in its various forms such as waste of waiting, wasted time… etc.

Figure (4.10) shows an example of a Lean Consumption Map used to deduce the new generation of value stream mapping.
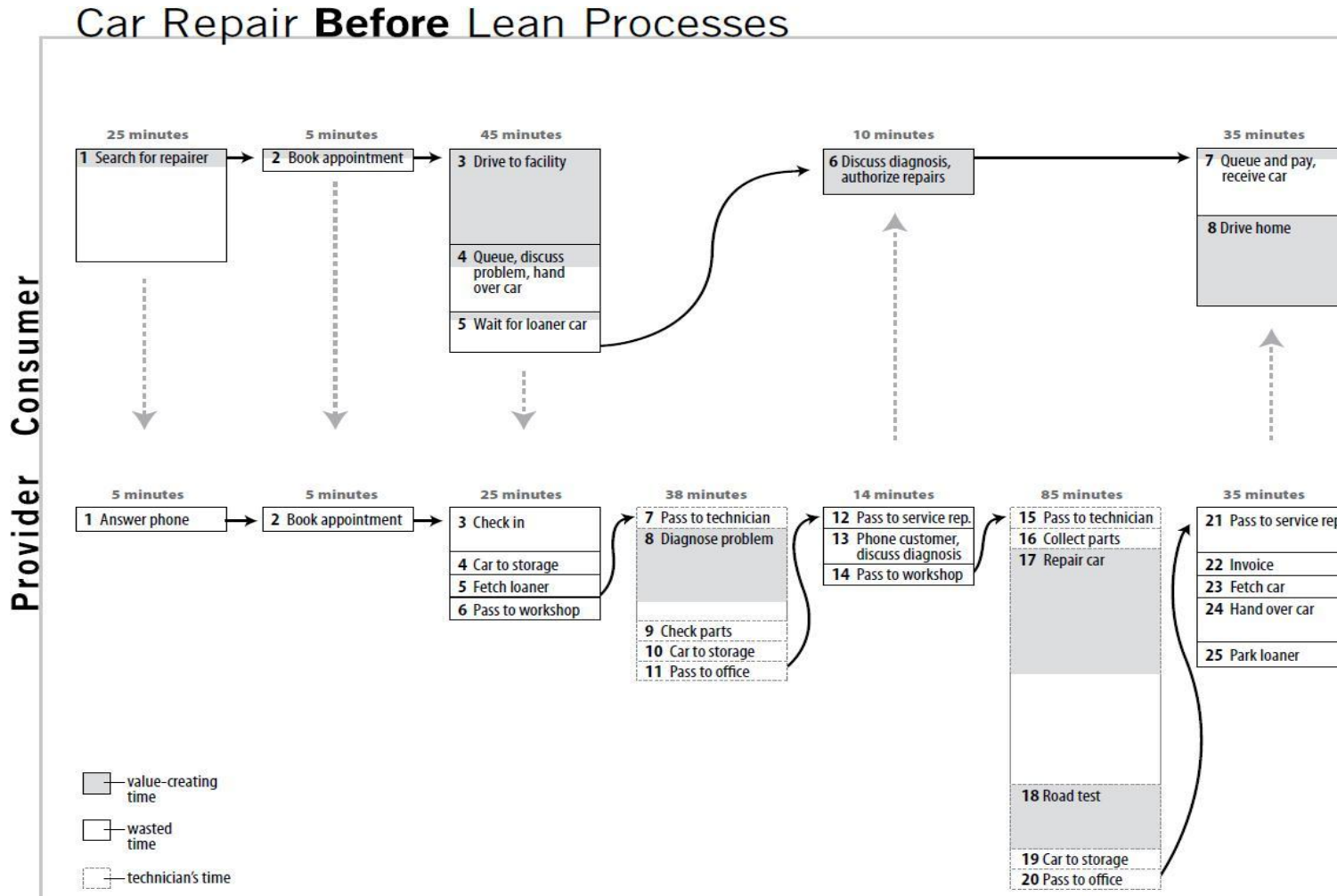
Car Repair **Before** Lean Processes

Source: (Womack, Jones 2005).

Figure (4.11) shows an example of the conceptual new generation of Value Stream Mapping for a task activity of an office.
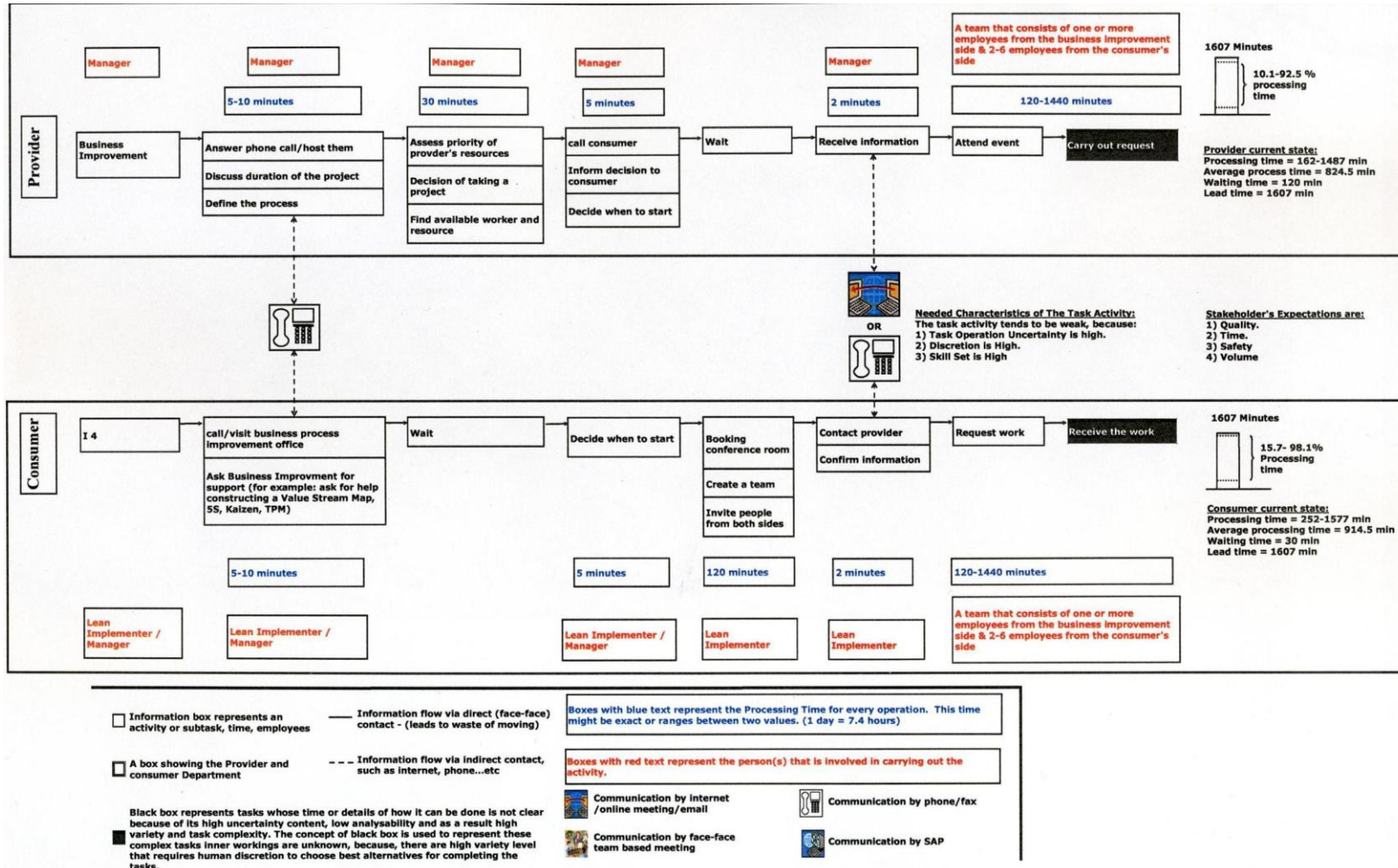
4.11   Does the Final Version of the Conceptual Model Fulfil the Aim of this Study!

Chapter 3 successfully answered research question 1 by identifying a list of variables that can be used to characterise offices as shown in section 3.2.7. Section 4.2.11 also answered research question 2 by identifying the office management systems, which are used within the model to redesign the office. The developed conceptual model, which is presented in sections 4.6, 4.7 and 4.9, provided initial conceptual answers for research questions 3 and 4 of this research inquiry. For instance, an initial attempt to answer research question 3 was initiated, by creatively proposing a methodology of implementation for redesigning an office in terms of its main management systems. It also attempts to provide initial answers for research question 4 by proposing an original conceptual new generation of value stream mapping, which can creatively map organic task activities that tend to be uncertain, complex and unanalysable. In summary, this conceptual model gave an initial answer for the main aim of this study by developing a novel tool for redesigning offices and their management systems by the manager of the office. However, the answers to research questions 3 and 4 were confirmed by testing and validating this conceptual model as will be shown in Chapters 6 and 7.

4.12   Summary

This chapter started by further analysing the qualitative data captured from the pilot studies. This qualitative analysis was carried out using thematic analysis with the aim of exploring common organising themes, which were regarded to be the office management systems needed to build the conceptual model. The office management systems, which emerged from the pilot study analysis, were expanded by linking them to cited literature. As soon as these themes were fully identified, they were compared with rival explanations. This comparison was done by using the subsystems of three well-established models (e.g. the VSM, McKinsey 7-S and Galbraith Star Model) (Yin 2000). This is considered to have improved the internal validity of this empirical phase of this study as advocated by Yin (2003). The causal relationship between the various basic themes and variables were identified from cited literature for each of the management systems of the office. These were

demonstrated and summarised graphically using mind mapping. At the end, the methodology of implementation was built iteratively based on the model building criteria which includes the consideration of the explanatory relationships and other theoretical assumptions. The conceptual methodology of implementation consisted of a linear set of guidelines, which also utilised a conceptual new form of value stream mapping. The aim of this new generation of Value Stream Mapping is to map organic task activities, which can then be used along with the conventional form of value stream mapping to map mechanistic task activities.

The next chapter outlines the research design as well as the methodology followed to test, develop and refine the model of this research inquiry. It also presents the methodology used to validate the model. It will present a plan, which will show how the model is going to be tested and validated in Chapters 6 and 7.

5 *CHAPTER FIVE: Planning the Model Testing and Validation Stages*

5.1 Introduction

In the earlier chapter a model was derived to assist with the design of the managerial approach to offices.

This chapter will detail how the model was to be tested and validated. In addition, it will present the research design adopted to test the model as well as the research design adopted to validate the model.

5.2 Model Testing

Testing the model focuses on determining if the model is actually producing change in the management of the offices. It aims to find out whether the recommendations made by applying the model either confirm the existing management of the office or recommend changes to it. The model validation phase, presented in section 5.3, focuses on examining if the managerial perception related to whether these changes produce improved performance and improved employee participation. The actual validation process is explained in chapter 7.

The four research questions of this research inquiry (i.e. research questions 1-4) presented in section 2.10.3 in chapter 2 were answered and were an intrinsic part of the formation of the model. The testing of the model and subsequent validity testing will determine if these questions were answered correctly when the model was formed.

In order to use and test the proposed conceptual model, there is obviously a need for criteria to guide the process of testing the model. In addition, there is a need for a strategy to gather the data to populate the model and apply it to the case studies. The process of building the appropriate methodology needed for this testing phase is explained below:

5.2.1 <u>Adopted Criteria for Testing the Model in Both Case Studies</u>

The testing of the model is done in terms of two perspectives, general perspective and detailed perspective. The general perspective aims to investigate the correctness of the overall flow of the methodology of implementation in terms of the two following issues: 1) To ensure that the model has the right sequence of stages based on the causal relationships between the variables within each of its stages. 2) To ensure that the right stages within the model have been used without any stages being missing or superfluous. This general perspective utilises the concept of pattern matching advocated by Yin (2003), which aims to identify how the model following its testing may differ from the original predicted conceptual model.

On the other hand, the detailed perspective aims to investigate the correctness of each individual stage of the model in terms of the following issues: A) To ensure that the right strategy for identifying the needed respondent, who can correctly and thoroughly answer the objectives of the stage, is adopted for each of the stages. B) To ensure that the appropriate research and data collection method needed to gather the required information of each stage is used. C) To ensure that the right variables are used within each stage of the model without any variables being missing or superfluous.

As far as testing the conceptual new generation of Value Stream Mapping, which was built within the model, is concerned section 5.2.2 presents how action research strategy was employed for the purpose of this testing. This prompted the need for different criteria to test this conceptual new generation of Value Stream Mapping. These criteria are: 1) To examine if this conceptual new generation of Value Stream Mapping can produce a map by the employees of each office. 2) To examine if this New Generation of Value Stream Mapping can cope with drawing organic tasks, which are complex, unpredictable and unanalysable. 3) To investigate any improvements related to the performance measurements used within the map, which may be recommended by the employees. 4) To investigate any other general improvements related to the graphical design and layout of the map.

5.2.2 Research Design for the Model Testing and Refinement Phase

This empirical phase aims to test and refine the conceptual model of this study. A summary of the design of the research process used for this purpose is shown in Figure (5.1). The actual testing of the model is carried out for two case studies as shown in Chapter (6). The design of the research process used to test the model is presented below:

5.2.2.1. Design of the Adopted Research Philosophy and Research Approach

A pragmatist philosophy was adopted while carrying out this research project for the following reasons:

1) The mixing of qualitative and quantitative methods, which can be enabled by the use of pragmatist philosophy, can make the case study research more rigorous (Meredith 1998).

2) The use of mixed methods improves the potential of developing new theories (Meredith 1998).

3) The mixed methods are viewed to be complementary to each other, which is called compatibility thesis (Creswell 2003).

Pragmatism chooses between the deductive and inductive approaches as needed within this part of the project (Creswell 2003). Testing the model as a whole is carried out inductively, because the data is collected, analysed and then used to refine the model of this study as shown in Chapter 6.

Figure (5.1) shows a summary of the design of the research process of the model testing phase of this study.
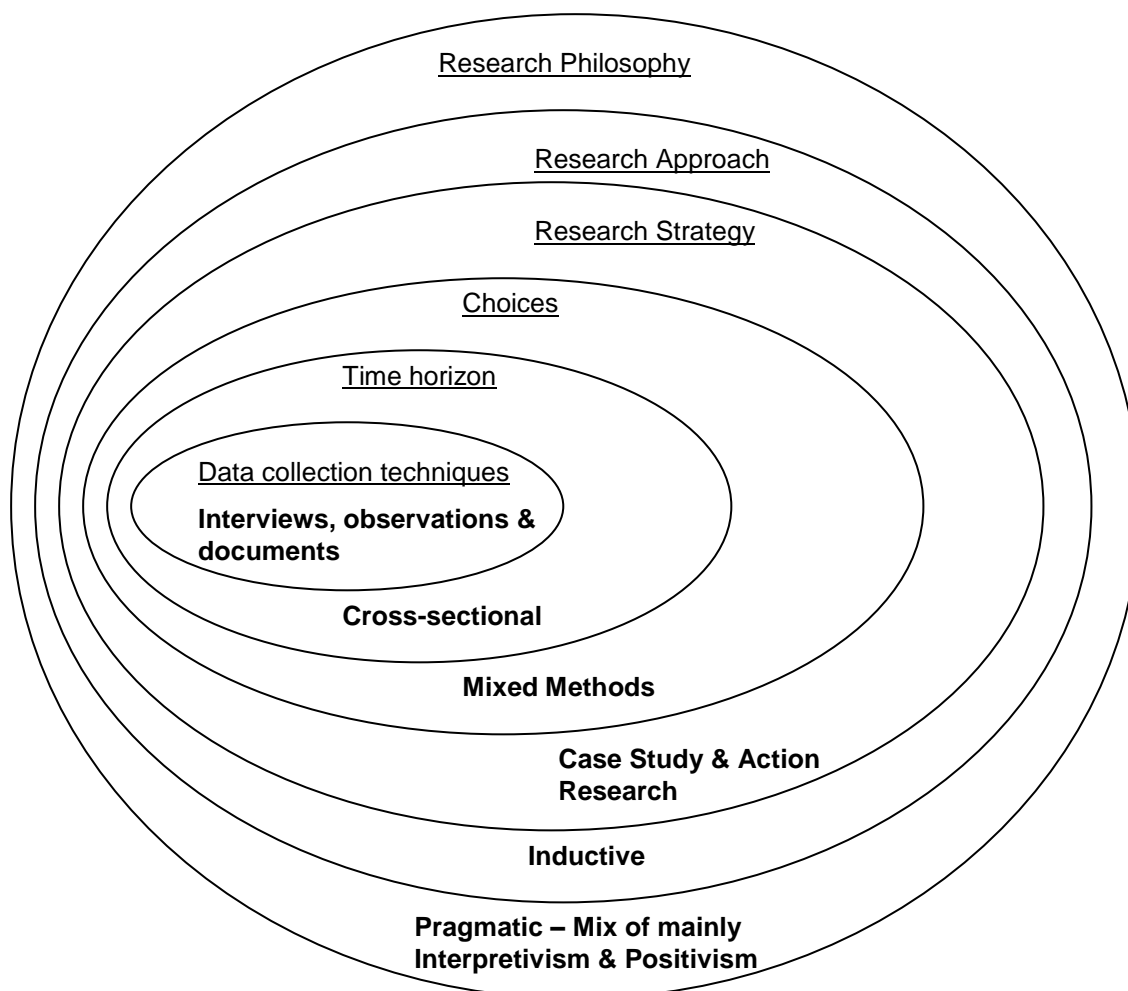
Source: adapted from (Saunders, Lewis et al. 2006).

5.2.2.2. Research Strategy Design

The strategy adopted to test the model of this study consisted of a combination of multiple case study design and action research. These two research methods are explained below:

1.   Case Study Research

Case study research was used for the following reasons: 1) Case study strategy is suitable when there are too many variables which are difficult to quantify (Bonoma

1985, Yin 2003) (e.g. task uncertainty, task interdependence, task complexity etc.). 2) Yin (2003) argues that case studies are used to understand more fully the nature of the relationship between the organisational variables, real-life events and small group behaviour. 3) Case studies are more rigorous in operations management over other positivist methods such as statistical modelling and optimisation techniques and simulation (Meredith 1998). 4) Case studies provide a thorough interpretation of the "how and why" research questions (Meredith 1998, Yin 2003, Rowley 2002), as well as 'what' research questions (Saunders, Lewis et al. 2006). 5) Case studies can enable understanding this phenomenon using different sources of data collection (i.e. triangulation) (Meredith 1998). 6) Case study research seeks to build a theory (Bryman, Bell 2007, Voss, Tsikriktsis et al. 2002, Stuart 2002, McCutcheon, Meredith 1993). 7) Case study research is suitable for operations management studies, as they usually include causal and time-dependent relationships that are needed to be understood using evidentiary chain (Stuart 2002). 8) Case study research provides tools and techniques which can compare between variables and characteristics across organisations (Stuart 2002).

Multiple case study design is used in the model testing phase of this research project. Although multiple case study design provides compelling and rigorous evidence (Herriott, Firestone 1983), only two case studies were used. Those two case studies helped in proving the successful applicability of the model on each of their offices. However, since the two case studies were consulting type offices that were small and organic, it may be possible to generalise the applicability of the model into small organic consulting type offices. This generalisation was considered valid because the external validity of the research was enhanced through the use replication logic (Yin 2003). This logic aims to identify if the two similar case studies (i.e. the two organic consulting type offices) used can support the model by producing replicated results (Yin 2003), as will be further explained in section 6.4. The use of replication logic while applying the model into the two similar case studies managed to produce replicable results, therefore, it is considered that the two similar case studies supported the model (Yin 2003) and that the use of the model can be generalised in consulting type offices that are small and organic. In addition, this

model is hopefully applicable to other types of offices that are operating in different service sectors. However, further validation needs to be carried out by future researchers in order to confirm the applicability of the model in those different office types. This is discussed in more detail in section 9.5.

Theoretical sampling was adopted to select the type of case studies for theoretical reasons rather than statistical reasons as advocated by Glaser and Strauss (1967). The selection strategy adopted in the model testing phase aimed to fill the theoretical category (i.e. organic system) while selecting cases of an extreme situation (Pettigrew 1990, Huberman, Miles 2002). This is a form of the extreme case sampling technique (Creswell 2004, Patton 2002), which can provide transparently observable phenomena of interest (Pettigrew 1990, Huberman, Miles 2002). Consequently, two case study offices that exhibit predominantly organic characteristics were selected as many authors agree that any organisational unit fits within a quantum of a mechanistic system in one end and an organic system in the other (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007, Magnusen 1977).

This choice was also mainly influenced by the aim of this research project, research questions as advocated by Rowley (2002). It was found to be congruent with one of the aims of this study related to testing the new generation of value stream mapping. Also, this choice allowed the use of literal replication logic which is advocated by Yin (2003).

On the other hand, selecting offices primarily exhibiting mechanistic characteristics was avoided, because it was considered that there was a need to have a number of organic task activities in each office to fully test the new generation of value stream mapping. However, Magnusen states that there are no pure mechanistic or organic offices and there is always a mix of both (Robey 1991). This raised the issue of investigating which part of the office is mechanistic and which part is organic. An initial attempt was made when selecting a mechanistic or organic office to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991). Magnusen advocates that a consulting or research and development organic type

office has the least percentage of mechanistic tasks (Robey 1991). He advocates that a consulting office consists of up to 7% percent mechanistic tasks and 93% organic tasks (Robey 1991). On the other hand, Magnusen advocates that a finance office tends to have the highest percentage of mechanistic tasks and the least percentage of organic tasks. He advocates that a finance office consists of up to 36% organic tasks and 64% mechanistic tasks (Robey 1991). When the realistic mix of organic and mechanistic tasks was compared between a finance office and a consulting office based on the work of Magnusen, it was found that choosing a consulting office that exhibits organic characteristics tend to have a lower mix between the two types of tasks. Based on this, it was initially considered that selecting an internal consulting and development office for each of the case studies is more representative of organic offices as it offers more visibly observed characteristics as advocated by Pettigrew (1990) and Huberman and Miles (2002). In addition, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office was interviewed to indicate what part is organic and what part is mechanistic. In addition, informal conversations took place with the manager of each office prior to starting the model testing phase with each to find out which part of the office is mechanistic and which part is organic. The manager of the Rolls Royce indicated that 90% of the tasks of the office are organic. He also explained which part of the office was mechanistic and which part was organic as shown below:

"The e-catalogue is more predictable because the process is fixed… the other ones are the e-sourcing, e-collaboration & e-scheduling…These are the main tasks of the office… They do not have fixed process, because they are done by applying different dimensions to them, which relies on humans"

"The employees of e-sourcing, e-collaboration & e-scheduling tended to have higher skills… the e-catalogue is really for secretaries, you know for secretaries if they need to order any bills, pads and pens."

"e-sourcing, e-collaboration & e-scheduling got delegated authority… with e-catalogue you can only choose the suppliers that we've made deals that provide the

catalogues… you can't go outside… You'd penalised if you ever went and did that… yah…"

"e-scheduling tasks are the runners, because they are 40%. e-sourcing tasks are the repeaters, because they are 30%. e-collaboration tasks are the repeaters, because they are 20%. e-catalogue tasks are the strangers, because they are 8%. Other random tasks are the strangers, because are 2%"

Source: Exostar team manager on 2/3/2006 as shown in Appendix (M)

However, the manager of Siemens office indicated that 95% of the tasks of the office are organic. He also described which part of the office was organic and which part was mechanistic by stating the following:

"I would say the main tasks of the office are unpredictable… for instance Training Process is about 45%. 30% Business Improvement Request for Support in mainly lean implementation issues such as Value Stream Mapping, Total Productive Maintenance TPM, Kaizen Type Activities, 5S (Repeaters 30%). Lean Assessment is about 20%... there is also other admin related work (Strangers 5%)"

"The only routine tasks are the ones related to administrative issues… these are about 5%"

Source: Business improvement manager of Siemens on 14/12/2005 as shown in Appendix (N)

The choice of the offices exhibiting primarily organic characteristics was carried out in two large manufacturing organisations for various theoretical reasons: 1) Both organisations have been well-known in their successful implementation of lean on the shop floor and were actively keen in finding out about ways to improve the office. 2) Both case studies are internal consulting offices of manufacturing firms (i.e. Rolls Royce and Siemens) within the same industry (i.e. Turbomachinary) 3) The employees of both firms were aware of the lean philosophy and value stream mapping, which will enhance the implementation of action research. 4) Easy access

was provided to each firm because contacts that are interested in this research were secured. Table (5.1) illustrates the type of case study used in this part of the research as well as the reasons for selecting it.

One of the disadvantages of using case study research is that it is time and resource consuming especially when multiple case studies are used (Meredith 1998). As mentioned earlier, for the manageability of this research only two case studies were carried out during the model testing phase which puts a case for future work as will be in Chapter 8. Another disadvantage is related to the use of triangulation as it might cause loss of control over the collected data (Meredith 1998). Consequently, it was considered necessary in this research project to plan the various tasks related to each case study before starting them. Case study research is criticised because it requires the researcher to have high skills such as interviewing skills (Meredith 1998). This promoted the need to improve the skills of the researcher by carrying out mock interviews. These mock interviews were carried out with the help of other researchers who worked in Loughborough University.

Table (5.1) illustrates the reason for choosing each organisation that provided case study to test the model of this research inquiry.

Case Study	Why select it?	Organisation Kind
Siemens Industrial Turbomachinary ltd – Business Improvement Office of the Business Excellence department	• An internal consulting office that exhibit highly organic characteristics • Employees are aware of lean & value stream mapping implementation • Availability of an established contact who can provided reliable access • World leading organisation & quality brand	Industry, energy and healthcare sectors
Rolls Royce – Exostar e-Procurement Team of the Procurement Department	• An internal consulting office that exhibit highly organic characteristics • Employees are aware of lean & value stream mapping implementation • Availability of an establish contact who can provided reliable access • World leading organisation & quality brand	Aircraft engines, marine and energy sectors

Yin's method in designing case study research has been followed during the design of this case study research. He advocates the identification of five main components that are necessary for the success of the design. These components are explained below:

A. The questions of the study (i.e. research questions three and four) needed to be answered. Both of the questions are 'how' questions (Saunders, Lewis et al. 2006, Yin 2003) as shown in section 2.10.3. Research question three aims to investigate how various office management systems can be (re)designed with the aim of making it more effective and leaner. Research question four aims to investigate how the organic task activities of the office can be mapped using a new generation of value stream mapping.

B. The construction of a conceptual framework or model (Miles, Huberman 1994), which predicts various main constructs and variables needed to be considered (Voss, Tsikriktsis et al. 2002). Chapter 4 showed how this conceptual model was developed based on findings from the literature review and other early evidence collected from the pilot study research as advocated by Rowley (2002).

C. The unit of analysis (i.e. case under investigation), has to be identified (Yin 2003). Yin (2003) advocates that the unit of analysis could be an individual, a group of people, a department, an organisation or an operation system. The unit of analysis in this research design is offices. The unit of analysis was identified accurately from the research questions of this project as advocated by Voss, Tsikriktsis et al. (2002). An attempt was made to ensure that this unit of analysis can satisfy all issues related to answering the research questions (Diefenbach 2009).

D. Linking data to propositions logically and identifying the criteria used for interpreting the findings (Yin 2003). This stage foreshadows the data analysis steps in the case study research, which is related to the use of data analysis techniques such as pattern matching and explanation building (Yin 2003) as will be shown in Chapter 6.

E. The criteria used to interpret the findings of the study, such as using and identifying rival explanations in the early stages of the design. However, this can also be used during data analysis through the use of all available evidence which covers all potential explanations of the findings and keeps the focus on major aspects of the study (Yin 2003). This will be shown in more detail in Chapter 6.

2.   Action Research

Action research was used as a strategy for the following reasons: 1) It combines both gathering of data as well as facilitation of change (Saunders, Lewis et al. 2006). 2) It is explicitly concerned with the development of a theory (Eden, Huxham 1996). 3) It is used when a consultant type researcher focuses on the subsequent transfer of knowledge gained from one particular context to another (Eden, Huxham 1996). 4) It is specifically beneficial for 'how' questions (Saunders, Lewis et al. 2006). 5) It allows the person carrying out the research to get involved in the action for change and subsequently application of the knowledge possessed elsewhere because of its explicit focus on action and promoting change within an organisation (Eden, Huxham 1996). 6) It allows the employees to get involved throughout the research process because employees are more likely to implement change they have assisted to create (Schein 1999). 7) It allows the utilisation of 'process consultation' (Schein 1999). Process consultation is when the researcher takes the role of a consultant who would help the client (i.e. person or manager sponsoring the research) to perceive, understand and act the process events that happens in their environment to enhance the situation as the client sees it. Process consultation helps the client to gain the skills of diagnosis and correcting organisational problems so that s/he can develop autonomy in enhancing and improving the organisation (Schein 1999).

Saunders, Lewis et al.'s (2006) action research process shown in Figure (5.2) has been adopted to guide the action research process used within this study. It consists of the following four themes as shown below:

A. It focuses on the purpose of the research. This is concerned with the resolution of organisational issues such as the implications of change along with those who

directly experience the issues. This is found to be congruent with the nature of Value Stream Mapping as a tool that can induce change in organisations by the employees involved in it (Tapping, Shuker 2003, Keyte, Locher 2004).

B. It refers to the involvement of practitioners in the research by having a collaborative democratic partnership among researchers and practitioners. Eden and Huxham (1996) state that action research findings result from the 'involvement of with members of an organization over a matter which is of genuine concern to them' (Eden, Huxham 1996). Coghlan and Brannick (2005) state that the researcher becomes part of the organisation where the research and change process are occurring, rather than more classical research or consultancy where, for instance, the workers are objects or subjects of the study. The researcher became part of the organisation while testing the new generation of Value Stream Mapping in each case study.

C. It stresses the iterative nature of the research process, shown in Figure (5.2). This iterative nature is a cycle between diagnosing, planning, taking action and then evaluating. The context of which this spiral started was how to map organic task activities of the office. This required diagnosis by developing the conceptual new generation of Value Stream Mapping. Then, planning took place as evident in the case study protocols of each case study shown in Appendix (O). The actual testing shown in chapter six using the two case studies represents the process of taking action and evaluating. This was also done iteratively for each case study.

D. It focuses on having implications beyond the immediate project. In other words, that the results must clearly inform other contexts. A final version of the tested new generation of Value Stream Mapping is finalised in Chapter 6.

Figure (5.2) shows the action research process adopted in this study.
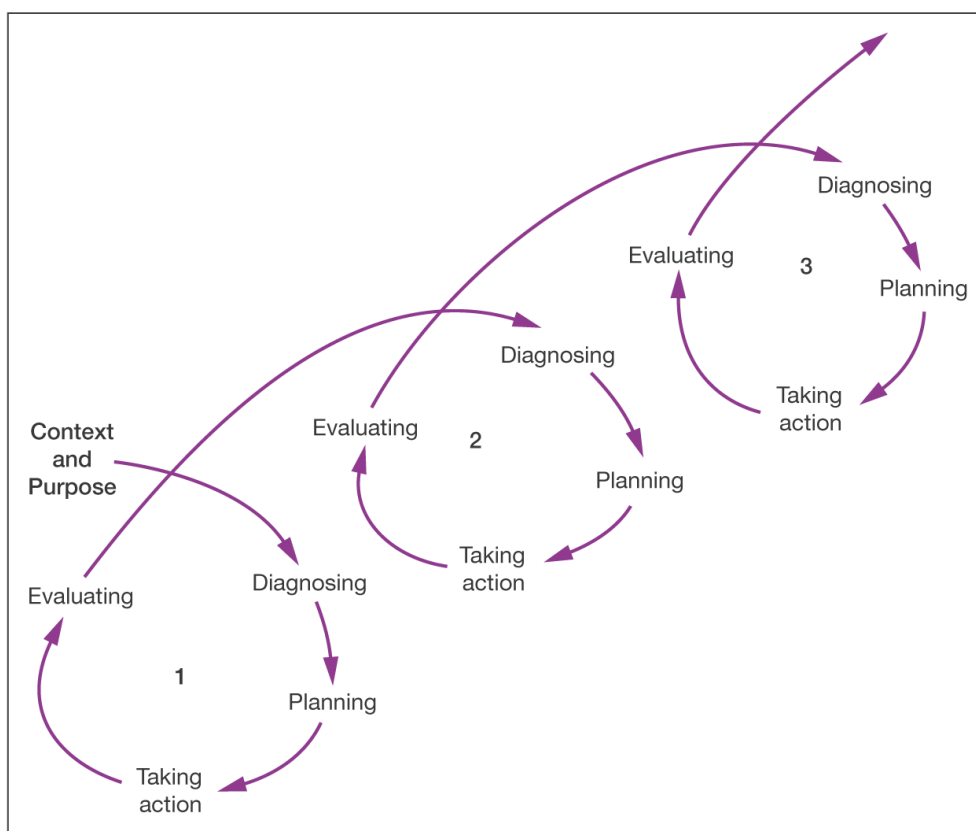
Source: (Saunders, Lewis et al. 2006).

5.2.2.3. Data Collection Strategy

The data is collected during the model testing and analysis using semi-structured interviews, direct observations and documents. This enabled the utilisation of triangulation using different data sources to corroborate the evidence from one source against another. These data collection techniques were used to populate the model by applying it to each case study. In other words, the model was tested by applying each of its stages to each case study.

Since this model is to be applied to case studies of offices. The general strategies used to collect and analyse data in case study research are going to be used to populate the model. Two general strategies were adopted based on the work of Yin (2003) to populate the model. These strategies shaped the design of the questions used within the interview protocol. The first strategy used was to depend on the

conceptual model of this study in shaping the data collection plan which led to this study (Yin 2003).Consequently, the interview protocol was designed in such a way that it was guided by the various steps of the model with questions which answered each stage sequentially. It is worthwhile to note that the research method used to populate the model and capture data from the first case study (i.e. Siemens) were all qualitative and open-ended, as shown in the interview protocol presented in Appendix (K). This was done because it was initially considered that qualitative data was better than quantitative data for the following reasons: 1) Qualitative data can give higher density of collected information than quantitative data (Bryman, Bell 2007). 2) Qualitative data can provide the research with more flexibility in the structure which enables the researcher to generate more new ideas (Bryman, Bell 2007). 3) Qualitative research is a good tool for understanding the theory dictating the research (Gillham 2000). As a result, it is worthwhile to note that quasi-quantification (Bryman, Bell 2007) was the qualitative data analysis type that was used in the first case study. This data analysis technique focuses on using terms such as 'frequently', 'many', 'some, 'a little', 'often' and 'rarely' etc to enable the researcher to make allusions to quantity (Bryman, Bell 2007).

The second strategy adopted, which works with the first strategy, was to examine rival explanations from rival theories (Yin 2003, Yin 2000). For instance, rival explanations were particularly used to qualify or disqualify any superfluous variables from the model being tested, as shown in section 6.2.6 in Chapter 6. Another example is when explanations were used based on cited literature to justify the results of applying the model to both case studies using literal replication logic, as shown in section 6.4 in Chapter 6.

As mentioned earlier, it is worthwhile to note that the model was tested using the first case study (i.e. Siemens). The research method used to populate the model was pure qualitative. When the model was being tested using the first case study, the limitations of using pure qualitative research method to populate the model were accepted. These limitations were mainly related to the big dependence on the perception of the manager while both populating the model and evaluating each of

its stages using the quasi-quantification as shown in more detail in section 6.2.7. Consequently, it was believed that the research method adopted to populate the model could be improved by using mixed methods research rather than pure qualitative research as advocated by Bryman and Bell (2007). According to Yin (2003), this is considered to be the third data collection strategy used to populate the model of this study. This also instigated the need to test the model using a second case study (i.e. Rolls Royce). This time the model was populated using two types of questions. The open-ended questions used within the interview protocol of the model were formulated in a way that can help the respondent to give direct answers without the need for any in-depth analysis. Semantic differential scales shown in Table (6.6) were also used to collect data, because they were considered to be good indicators of a concept or construct (Corbetta 2003). In a semantic differential scale shown in Table (6.6) a single idea or object on a series of bipolar rating scales is answered by the respondent (Saunders, Lewis et al. 2006). A pair of opposite adjectives describes each end of the bipolar scale, which is designed to anchor the attitude of the respondents towards service (Saunders, Lewis et al. 2006). An attempt was made to measure the semantic differential scale quantitatively unless the nature of semantic terms was not quantifiable (Harasym, Boersma et al. 1971). While analysing the scales, every effort was made to maximise the use of the quantitative aspect of the analysis (i.e. using percentages or statistical calculations). On the other hand, if the variable evaluated using the semantic differential scale was not quantifiable (i.e. has a qualitative nature), it was analysed qualitatively. This qualitative analysis of the semantic differential scales was carried out using two analytical conditions customised based on the answer of the variable the scale is attempting to evaluate. While developing these two conditions needed to analyse each pure qualitative scale, every effort was made to maximise the use of cited literature in order to reduce the subjectivity in their qualitative analysis.

There was a limitation of having one respondent (i.e. the manager of each case study office) to gather data to populate the majority of the stages of the model excluding two stages that are related to drawing the Value Stream Maps for each case study office. It is worthwhile to note that the Value Stream Maps of each case

study office were drawn using a team of employees along with the manager of each office. However, the manager was the only person to be interviewed while populating the majority of the stages of the model because this model is meant to be used mainly by the manager of the office to redesign their own office based on their own perception. The effects of having one respondent while populating these stages of the model were reduced through the utilisation of both triangulation using multiple data sources and triangulation of mixed methods research. This limitation was also reduced by having informal conversations with other employees in the office if any issue needed to be confirmed.

It is worthwhile to note that a standard procedure for action research was incorporated within the case studies used to test the model. This standard procedure is further explained within section 6.2.4.

5.2.2.4.   Data Collection Techniques Design

Although qualitative methods were used to collect data in the first case study and mixed methods were used to collect data in the second case study, the data collection techniques used in both case studies were similar (i.e. interviews, direct observations and documents). The main data collection techniques are explained below:

1.   Interviews

It was considered more accurate in this research to use a standard procedure for carrying out interviews as a data collection method during both model testing and validation. This procedure is explained in more detail in section 6.2.2.1.

Interviews were used to collect data from the first case study (i.e. Siemens) because the research is pure qualitative. As a development to the data collection method used to populate the model, the model was populated from the second case study (i.e. Rolls Royce) using mixed methods research. This entailed the use of quantitative methods along with qualitative to collect data through interviews. However, the use of quantitative methods along with the qualitative ones did not

influence the applicability of incorporating interviews as a data collection method. This is because Amaratunga, Baldry et al. (2002) advocate that interviews can also be used in quantitative research while collecting information related to evaluating attitudes and behaviours. Since the nature of the questions used within an interview usually determines whether it is related to qualitative or quantitative data (Easterby-Smith, Thorpe et al. 2002), the questions used while populating the model from the Siemens case study were mainly open to reflect their qualitative nature whereas the questions used to populate the model using the Rolls Royce case study were a mix of open questions and semantic differential scales. Semantic differential scales can be either quantitative or qualitative when used to measure an attitude (Harasym, Boersma et al. 1971). In this research, both qualitative and quantitative semantic differential scales were used to populate the model from the Rolls Royce case study.

The disadvantages of using interviews as a data collection method are further discussed in section 8.6. It also explains how the effect of these disadvantages was reduced.

2.   Direct Observations

It was considered more accurate in this research to use a standard procedure for carrying out direct observations as a data collection method during the model testing phase. This procedure is explained in more detail in section 6.2.2.2.

The main advantages of using direct observations were related to the fact that it allows triangulation of multiple sources of data. Consequently, various sessions of direct observations were carried out for each of the case study office to supplement the data collected from the interviews. However, there are also disadvantages of using direct observations as a data collection method. These disadvantages are further discussed in section 8.6 which also explains how the effect of these disadvantages was reduced.

3.   **Documents**

Various types of documents were collected while carrying out each case study. These include catalogues, internal reports and conventional value stream maps. After collecting them from each office, permission was obtained to analyse them. These documents provided insight about each of the case studies in different ways depending on the nature of the document as shown in section 6.3.4. For instance, some of the documents provided insight about the organisation in general as well as the market they operate in. Other documents provided understanding about the nature of various task activities and how the employees planned their work. This will be explained in further detail for each of the case studies in section 6.3.4.

5.3   <u>Model Validation</u>

This stage aims to validate the model of this study following its testing and refinement. This validation was carried out in terms of two perspectives. The first perspective is industrial which aims to determine the usefulness of the model and examine the managerial perception related to whether these changes produce improved performance and improved employee participation. The industrial validation was done; because Wallis argues that validating a theory in a practical sense (i.e. outside academia) by gaining recognition of external professionals would provide another higher meaning for the validation of the theory (Wallis 2008). The validation in terms of the second perspective is academic which aims to stress the academic viability of this research. As a result of this validation, final recommendations and improvements will be made to the model which leads to a final statement of the model as shown in Chapter 7.

In order to validate the model there is obviously a need to follow guiding criteria. In addition, there is a need for a strategy to gather the data related to validating the model from an industrial perspective. The process of building the appropriate methodology needed for this validation phase is explained below:

5.3.1 <u>Adopted Criteria for Validating the Model</u>

The criteria used to validate the model from an industrial perspective are different than the ones used to validate the model from an academic perspective. The adopted criteria to validate the model from each perspective are explained below:

5.3.1.1. Adopted Criteria to Validating the Model from an Industrial Perspective

The actual validation from an industrial perspective aims to validate various issues related to the model. These are the model flow, the model steps, the office management systems used within the model and the new recommendations resulted for each of the case studies (i.e. the results of applying the model to each of the case studies). This is done by asking the manager of each office, who contributed with a case study for testing the model, about their opinion of the new design recommendations for their office. This will focus on identifying the opinions of the manager of each office in terms of various criteria. These criteria are the impact of the model on the performance of each of the case studies, the usefulness of the output of the model and the novelty of the model and its output. These criteria are listed below in more detail:

1) The usefulness of the model, its various tools & management systems as stated by the manager of each case study.

2) The strengths of the model, its various tools & management systems as stated by the manager of each case study.

3) The weaknesses of the model, its various tools & management systems as stated by the manager of each case study.

4) The perception of the manager with regards to any tangible benefits.

5) The perception of the manager with regards to any potential improved performance and improved employee participation.

6) The recommendations for improving the methodology of implementation, the office management systems and the new generation of Value Stream Mapping, which was stated by manager of Siemens.

7) Getting final approval on the exclusion of any superfluous variables during testing of the model.

8) The novelty of both the model for redesigning the office and its new design recommendations.

9) The novelty of the seven office management systems used within the model.

10) The novelty of the new generation of Value Stream Mapping used within the model.

11) Any other recommendations or improvements.

5.3.1.2. Adopted Criteria to Validating the Model from an Academic Perspective

The main aim of the validation from an academic perspective is to stress the academic viability of this research. This validation is carried out in terms of the following criteria:

1) To discuss any issues which can make this research project academically viable.

2) To discuss any issues which may make this research work invalid (e.g. sample size, small set of offices, number of respondents etc.).

3) To discuss how the effects of the issues that can make the work invalid, have been encountered.

4) To discuss if the results agree/disagree with any published literature.

5) To discuss any situations where this work may not be valid, its inherent weaknesses and how it has been attempted to ensure validity.

6) To discuss any validity tests which were used to enhance the quality of this research inquiry.

The design of the research methodology adopted to validate the model from an industrial perspective is shown below:

5.3.2 <u>Research Design for the Model Validation Phase – Industrial Perspective</u>

This focus on the subjective opinion of the manager of each office to validate the model from an industrial perspective prompted the need to consider an interpretivist philosophy. An inductive approach was adopted within this empirical phase for two reasons: 1) The adopted research philosophy was interpretivist (Saunders, Lewis et al. 2006). 2) The inductive approach allows final modification to the model to be carried out after collecting the data (Saunders, Lewis et al. 2006).

The research method adopted with this validation phase was qualitative because it is congruent with both the interpretivist philosophy and the inductive approach (Saunders, Lewis et al. 2006). It is worthwhile to note that qualitative research was considered more appropriate than quantitative research for the purpose of this validation. According to Hunter, Hari et al. (2005), qualitative research is used to validate a theory as "a process of comparing concepts and their relationships against data during the research process to determine how well they stand up to such scrutiny". However, Hunter, Hari et al. (2005) advocate that quantitative research is usually used to validate a theory in the sense of testing. Consequently, each of the questions used to gather data was a qualitative and open ended question. The strategy used to gather the data was guided by the criteria discussed earlier to validate the model from an industrial perspective. Appendix (P) illustrates an example of the questions used within the interview protocol of one of the case studies.

A summary of the design of the research methodology adopted to carry out this industrial validation phase is presented in Figure (5.3). The adopted research strategy was in the form of multiple case study research. The case studies utilised to validate the model were the ones which were used to test the model in Chapter 6.

Figure (5.3) illustrates a summary of the design of the adopted research methodology used to validate the model from an industrial perspective.
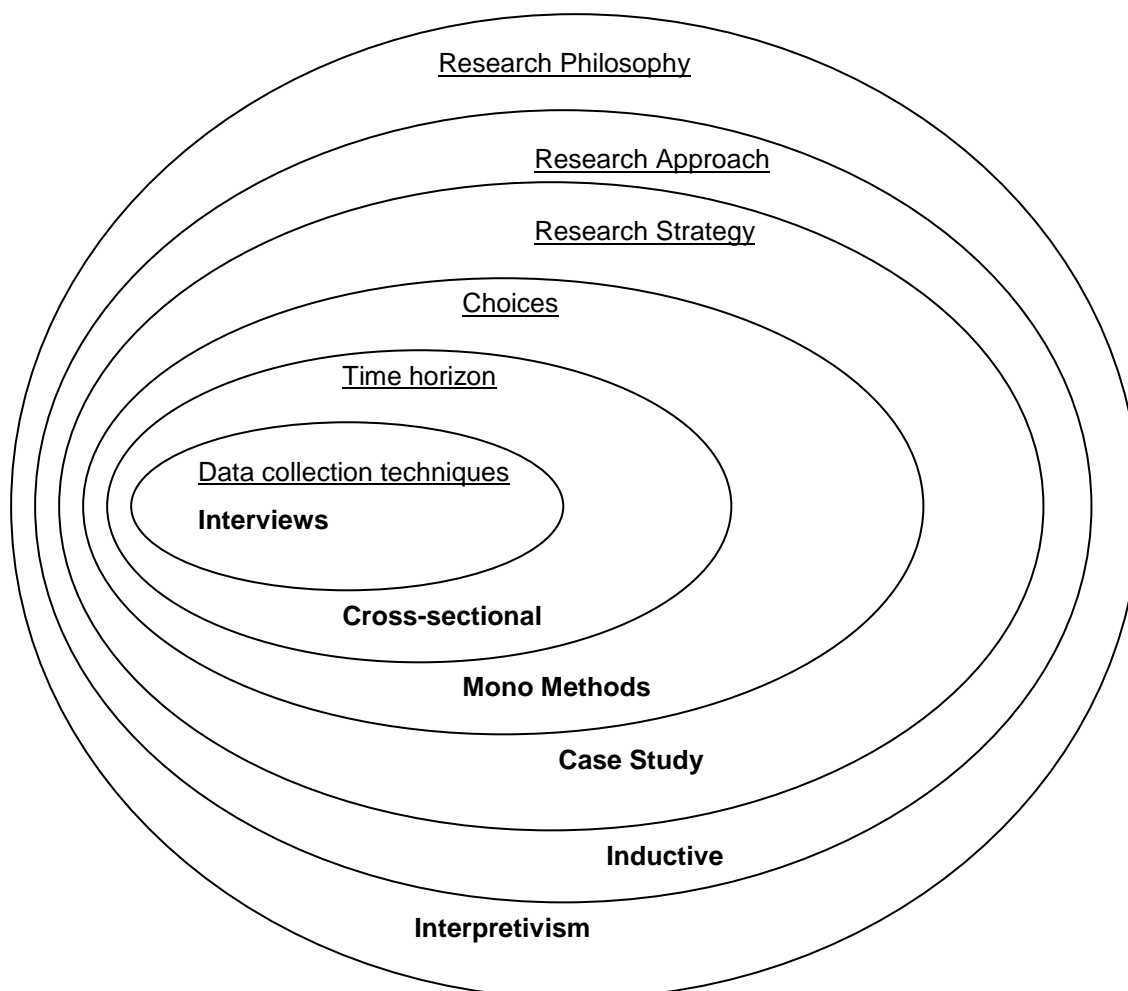
Source: inferred from (Saunders, Lewis et al. 2006).

5.3.3 Data Collection Strategy – Validation from Industrial Perspective

The data is collected during the model validation using semi-structured interviews. A plan was put to determine the data needed to validate the model using the case study protocol presented in Appendix (O). The manager of the Siemens case study, which was used to initially provide opportunity to populate the model, was interviewed to validate the model. Then the manager of the Rolls Royce case study, which was used to provide opportunity to populate the model, was also interviewed to further validate the model. For each case study used, an interview protocol was

used to gather the data. An example of the interview protocol used to validate the model using the opinions of the manager of the Roll Royce case study is shown in Appendix (P). As shown in the interview protocol in Appendix (P), at the beginning of the interview an overall view of the whole project was presented to the manager of each case study office. These managers were the same managers who were involved in populating the model during the model testing phase. This overview aimed to explain a description of the whole project as well as the various tools and models used within it. It started by explaining the aim of this project and the benefits of using the model of this study. The current state of the office as well as the new design recommendations of the office were presented to the manager in terms of seven office management systems as shown in Tables (P.1 and P.2) in Appendix (P). The mind map of these seven office management systems was also presented as shown in Figure (P.3). The model itself was presented in two forms. The first was a top up form of the model as shown in Figures (P.4, P.5, and P.6). The second was the model in terms of its detailed steps as shown in Figures (P.1 and P.2). Every single stage and component of the model was thoroughly explained to the manager of each office. In addition, the design recommendations of the office were represented in terms of each of the systems of the Viable System Model as shown in Figure (P.7). This showed how the current state of the office differed from the future state in terms of the five systems of the Viable Systems Model. This use of the VSM was also considered to help the manager of each office to judge the goodness, novelty, strengths and weaknesses of the new design recommendations of each office which were made by applying the model to each of the case studies. This showed the manager of each office whether the new design recommendations confirm the existing management of the office or recommend any changes to it. The maps of the new generation of value stream mapping of the task activities of each office were also presented to the manager, with the aim of validating this new generation of Value Stream Mapping as shown in Figures (P.8, P.9, P.10 and P.11) in Appendix (P). In addition, various appendices were put at the end of the interview protocol, which aimed to explain any issues that may arise during the interview. These appendices were used particularly if the manager of any of the case studies encountered difficulties in understanding the model or a particular concept / variable

used within it. The appendices explained the following: 1) The general issues related to the model such as a table that lists the alternatives of each of the variables used within the model. 2) A brief explanation of situation leadership. 3) A brief description of Competing Values Framework. 4) Various figures and tables which explain the types of interdependence and coordination modes used within the model. 5) A table that makes a distinction between mechanistic and organic systems. 6) A table that lists various forms of organic and mechanistic formal controls. 7) A table that makes a distinction between weak and powerful situations.

Various limitations were expected to have arisen whilst validating the model using the subjective opinion of the managers contributing to the case studies. The first manager interviewed was from the Rolls Royce case study office and the second manager interviewed was from the Siemens case study office. Various preventive measures were taken to counteract the effect of these limitations. These are explained below:

1) Limitation due to the fact that the manager of both case study offices (i.e. Rolls Royce office and the Siemens office) might be busy and may not be willing to answer the questions properly or thoroughly. Very little evidence of this limitation was found because the manager of each case study office was very generous with his time and was very enthusiastic about answering the questions. Nonetheless, every measure was taken to counteract the possibility of this limitation such as: 1) It was attempted to book the interviews for each of the case study offices at a time that was convenient to each manager. 2) The seriousness of the work was explained to the manager of each case study office by stating that the work is part of an award for a PhD degree. 3) The manager of each case study office was informed that it had been intended to publish this work in reputable academic journals, which will include their views about the tool.

2) Limitation due to the reactive effects and Hawthorne effect. Reactive effects are factors that constrain the ability of the researcher to generalise beyond the experimental settings (Bryman 1989) due to the presence of the researcher while validating the model (Bryman 1989). The Hawthorne effect refers to the

inclination of some individuals to work harder and perform better when they are participants in a research or experiment (Bryman 1989). This is because people may alter their behaviour due to the attention they get from researchers rather than because of any manipulation of independent variables (Bryman 1989). The 'demand characteristics' are another form of reactive effects of the experimental situation, which implies that participants often adjust their behaviour in order to support the hypothesis around which the experiment is tailored (Orne 1961). An attempt was made to be aware of these limitations while carrying out the interviews. However, very little evidence was found in relation to any of these limitations, because the managers seemed candid and were highly willing to be critical.

3) Although the manager of each office had a great deal of experience in restructuring offices throughout the whole of the organisation, it was considered that there may be limitations related to their lack of knowledge and/or bias in validating the model of this study and its findings. An attempt was made to reduce the managers' bias by stating the importance of their constructive criticism. Also since the model was validated using the opinion of the manager of the Siemens case study office and the manager of the Rolls Royce case study office respectively, it was attempted to cross check the feedback and constructive criticism of first manager with the latter one. For instance, after validating the model using the opinions of the manager of the Siemens case study office, it was attempted to raise the issues discussed by him to the manager of the Rolls Royce case study office during the validation interview of the Rolls Royce case study. This helped in cross checking the opinion of one manager against the other as shown in Tables (7.6, 7.8 and 7.9).

5.4   Tactics Used to Strengthen the Academic Validity of the Research Methods Used within the Model Testing and Validation Phase

A summary of the validity tests which were intended to be used in the model validation and model testing phase is shown in Table (5.2) based on the work of Yin

(2003). Table (5.2) illustrates the various tactics used to enhance the validity of each test.

Table (5.2) illustrates four validity tests which are intended to be used to strengthen the quality of the model testing and validation phase.

Test	Case Study Tactic	Tactics Carried out in Model Testing & Validation Phase
Construct validity	• Triangulation using multiple sources of evidence • Triangulation of mixed methods research • Establish chain of evidence • Have key informant review a case study report	• Triangulation through multiple data sources (i.e. interviews and direct observations and documents) • Triangulation through the mixed methods research in the 2nd case study • Established chain of evidence by allowing an external observer to follow derivation of any evidence from initial research question to ultimate case study conclusion • Established chain of evidence through triangulation • Model and its findings were validated by asking the subjective opinion of the manager of each research site
Internal validity	• Conduct pattern matching • Conduct explanation–building	• Pre-coding of data (i.e. using the conceptual model to guide data collection and analysis) and the use of tabular display of evidence • Supporting the explanation of the observed phenomenon using the findings of the interviews
External validity	• Use theories in single case studies • Use replication logic in multiple-case studies	• Ensure that research design addresses the theoretical questions • The use of literal replication in two case studies similar characteristics of predominantly organic tasks
Reliability	• Use case study protocol • Use case study database	• Case study protocol was used as a tool for guidance as well as communication of intentions within the research sites • Databases were created to gather all important information together

Source: adapted from (Yin 2003, Yin 2009).

5.5   <u>Ethical Issues in the Research</u>

Ethical issues arise during both gathering data from participants and requesting permission to access a research site (Easterby-Smith, Thorpe et al. 2002). Bryman and Bell advocate that researchers need to be aware of four main ethical principles (Bryman, Bell 2007) such as: 1) Harm to participants. 2) Privacy invasion. 3) Lack of

informed consent. 4) Deception (Bryman, Bell 2007). More caution was taken while carrying out any of the qualitative research within this project because of the importance of ethical issues when there is a heavy reliance on face to face interview (Easterby-Smith, Thorpe et al. 2002).

Various rights of participants were also considered while carrying out this research. These include explaining the aim of this study, the use of the research findings and being aware of any potential consequences of this study on their career or lives (Creswell 2004). It is worthwhile to note that participant names were kept anonymous and the interview transcripts were kept in a secure place.

5.6   Summary

This chapter started with providing the aim of testing the model. It also explains what testing the model means as well as the criteria used for testing the model. The design of the adopted research methodology used to test the model was presented. This involved the design of the strategy used to collect the data needed to test the model. The aim and meaning of validating the model in this research inquiry was also explained. In addition, the criteria adopted to validate the model were presented. Thereafter, the design of the adopted research methodology needed to validate the model of this study was discussed. The data collection strategy needed to validate the model was outlined. The design of the adopted methodology for each of the empirical phases started by identifying the required research philosophy all way to identifying the required data collection methods needed to answer the research questions. The tests and tactics which were intended to be used to strengthen the quality of the model testing and validation phase were also presented. These tests included construct validity, external validity, internal validity and reliability.

The next chapter presents how each case study was to be used to test and refine the conceptual model which was developed in Chapter 4 from both the literature review presented in Chapter 2 as well as the pilot study presented in Chapter 3.

6   *CHAPTER SIX: Actual Model Testing and Refinement*

6.1   Introduction

Chapter 4 presented how the conceptual model of this research inquiry was built from both an empirical pilot study phase as well as the latest literature. Thereafter, Chapter 5 presented a plan of the distinctive research methodology used for the model testing and model validation phases.

This chapter presents the actual testing and refinement of the proposed conceptual model. It also shows how the testing was to be carried out using a strategy which combines both multiple case study design and action research. This chapter also presents how the model testing phase contributes to the answer of research questions 3 and 4 of this research inquiry shown in section 2.10.3 in chapter 2.

The model was tested using two case studies. The first case study was provided by an office of Siemens Turbomachinary Industries and the second case study was provided by an office of Rolls Royce Plc. In order to test the model effectively, Eisenhardt (1989) argues that it is crucial to carry out multiple case studies in two stages: 1) Within cases analysis 2) Cross case analysis. The use of those two stages can generate further insight (Eisenhardt 1989). Consequently, each case study is presented separately in terms of various issues. These include the office background, data collection methods, data analysis, application each case to the model, model results for each case study and the recommendations made to the model following testing it using each case study. The application of the various stages of the model is presented for both the Siemens and the Rolls Royce case studies to illustrate the method used to populate the model from each case study. This shows the effect of applying the methodology of implementation to each case study while adopting structured criteria that aim to test and improve the model. The improvements of the model are discussed while analysing each case study individually. In addition, improvements of the model are also made based on cross case analysis. The cross case analysis also involves the use of techniques such as

literal replication logic to identify if the model results were replicable in two case studies (Yin 2003), which tended to exhibit predominantly similar organic characteristics. At the end, a final version of the tested model is presented.

6.2   Siemens Case Study

6.2.1 Office Background

This case was provided by Siemens, which is a large gas turbine manufacturing company located in Lincoln, UK. The number of the employees of the organisation was more than 1000 employees. They manufactured four different products classified in terms of the size of the turbine. The rest of their products were manufactured in a different German branch. The company was targeting the global market of heat and power generation and industrial applications (i.e. industries that supply energy). The main customers of the company were Seats Combined Heat and Power as well as most oil and gas companies worldwide (e.g. British Petroleum).

The business excellence department of Siemens was divided into different sections. The business improvement section was the office which provided this case study. The office was an internal consulting office which focused on business process improvement and the implementation of various lean tools and techniques across the whole organisation. This makes the office more of an autonomous consulting office which is more or less decentralised and functional. The office was small and consisted of seven employees. The ages of the employees ranged between (21 and 59). Various employees had various work experiences in the office. For instance, the manager of the office had a considerable experience of 43 years in Siemens whereas the other employees had an experience that ranges between 1-30 years. The manager pointed out that the employees were classified in the organisation in terms of their skills or specialities. This indicated that the organisation was functional however they were also part of a matrix organisation. The office also operated eight hours per day of which the employees are entitled of a daily lunch break.

Whilst carrying out this case study, the manager who initially was offered with a case study left the organisation. However, the new manager fortunately offered his whole-hearted support for taking part in the study.

An initial interview was carried out with the manager of the Siemens office to confirm that the office was homogeneous. This interview was guided using an interview protocol shown in Appendix (H). This was presented in Section 5.2.2, which shows how 95% of the tasks of the office were organic (i.e. this makes the office representative of an organic extreme type). The office was differentiated from the department and yet fully integrated using various IT systems.

The manager of the office indicated that the employees worked as part of a team where each one of them was carrying out any project as they may arise. This makes the office tend to have team interdependence (Thompson 1967).

6.2.2   Data collection Methods

As explained earlier in Chapter 5, the design of the adopted methodology used to populate the model using this case study was based on pure qualitative research. Interviews, direct observations and documents were used as the data collection methods of this case study. It is worthwhile to note that the concept of triangulation using various data sources was used. This allowed the corroboration of the evidence from the interviews against the evidence from the direct observations and documents as advocated by Eisenhardt (1989). This provided this research inquiry with the following: 1) Stronger substantiation of constructs and hypotheses (Eisenhardt 1989). 2) Enhanced its construct validity (Yin 2003). The data collection methods and techniques used in this case study are explained below:

6.2.2.1.   Interviews

As mentioned earlier, it was considered more accurate in this research to use a standard procedure for carrying out interviews as a data collection method. This procedure is used within this case study however it was also used during the model

testing and the model validation phases of this research. This procedure is explained below:

- The interviews were semi-structured and in-depth face to face interviews. For instance the interviews, which aimed to draw the value stream maps of any of the case study offices, were in-depth. This is because Tull and Hawkins (1993) advocate that an interviewer in an in-depth interview seeks to understand the step by step behaviour and tasks carried out by various employees within the organisation (Tull, Hawkins 1993).

- The manager of the office was the 'gatekeeper' (Neuman 2007), who selected the employees needed to be included within the data collection.

- Phone calls and emails were used to communicate with the gatekeeper of the office before starting the interviews. The intention of this was to explain the aim of this study, build rapport and explain what they will be getting out of it as advocated by Easterby-Smith, Thorpe et al. (2002). It was also attempted to communicate the importance of them taking part of this study. For instance, it was agreed to provide the manager of each office with both value stream maps of the tasks of the office and a case study report. This case study report aims to diagnose the design of its various management systems. This helped in sparking their interest as managers of both organisations were actively keen in developing the offices of their organisations to increase their leanness and effectiveness.

- The actual interviews were carried out in a suitable and quiet discussion room.

- The aim, duration and the way the information were to be used in this research project were explained to the interviewees prior to starting the interview.

- All interviews were audio-recorded to ensure accurate transcription and unbiased note taking (Easterby-Smith, Thorpe et al. 2002).

- The duration of each interview session was no more than one hour and fifteen minutes as recommended by Ghauri and Gronhaug (2005) (i.e. maximum 1hr 30 minutes).

- An interview protocol was prepared for each of the case studies to help in structuring the interviews and populate the model as advocated by Creswell (2003). For instance, the first page of the protocol contained general information such as the name of the firm, the name of the interviewee and his/her position. Then the list of questions used was presented.

- The funnel interview concept advocated by Sekaran (2003) was used while populating the model through answering the questions related to each stage of the model. This meant that a question was asked in a broad way then it was gradually narrowed down to more detailed issues that are most related to the research (Sekaran 2003).

- At the end of each interview, the interviewees were acknowledged for their help and support.

The number of the interviews carried out in this case study was four. The aim of these interviews was to populate the model shown in Figure (6.1) so that it can be tested effectively. This is further explained in the Siemens case study data base shown in Appendix (N). It was also agreed to provide the manager with both value stream maps of the tasks of the office and a case study report. This case study report aimed to diagnose offices and introduce new design recommendations for the seven management systems of the office.

The interviews were guided by the interview protocol shown in Appendix (K). The questions asked within the interview protocol were mainly qualitative open ended questions.

The first, second interviews were carried out in a discussion room in Siemens with the business improvement support manager. The first interview was done with the old manager however the second interview was conducted with the new manager. This was considered to have reduced bias and subjectivity in the data collected because two managers who filled that same position at different times confirmed the correctness of the gathered data. The aim of the two first interviews was to populate the first 10 stages of the model (i.e. the two interviews collected similar data about the office by getting the new manager to confirm the views of the previous manager about the office). The results of these interviews are shown in Table (6.2).

The third interview was carried in a discussion room in Siemens, however the fourth interview was carried out in Loughborough University because the employees wanted to come and visit the research group and know more about this study. These interviews were carried out with the new manager along with a team of employees as part of an action research strategy used within this case study research. A team of three employees was formed by the manager based on their ability to provide the data needed to draw the value stream maps of the office. These interviews were carried out with the formed team to go through stages 11-13 of the model shown in Figure (6.1). These stages were related to drawing the current state of the Value Stream Maps of the office as well as identifying general characteristics about the office. The Value Stream Maps, which were drawn during the interviews, are shown in Figures (6.2, 6.3 and 6.4).

6.2.2.2. Direct Observations

As mentioned earlier, it was considered more accurate in this research to use a standard procedure for carrying out direct observations as a data collection method. This procedure is used within this case study. This procedure is explained below:

- The direct observations started by obtaining permission from the gatekeeper (i.e. the manager of each case study) (Neuman 2007) to access their office and observe it under normal working conditions.

- All the workers of the office were observed under normal working conditions.

- The observations were non-participatory, because the observer was not part of the situation as advocated by Sekaran (1992). This meant that the researcher sat down in a corner of the office and observed how the individuals spent their time as advocated by Sekaran (1992).

- An attempt was made to carry out the observations as an outsider who did not contribute to the situation to reduce the chances of influencing the personnel behaviour as advocated by Graziano and Raulin (2007).

- An observational protocol was prepared to take the field notes during the visits to the office as advocated by Creswell (2004). This observational protocol is shown in Appendix (L).

- The issues observed were mainly related to variables collected within the interview protocol in order to allow triangulation of multiple sources of evidence by corroborating the evidence of one data source against the other (Creswell 2004).

- The effects of the observer on the observed were reduced by following a slow entry strategy to the research site (i.e. this was done by having short visits initially with few notes taken and then gradually increasing the observation time) as advocated by Merriam (1988).

- An attempt was made to put the observed at ease by being unobtrusive (Merriam 1988), which also helped in building rapport with them (Creswell 2004).

- An interrupted involvement role was used by the observer by being intermittently present in the office over a period of time moving in and out as advocated by Easterby-Smith, Thorpe et al. (2002). This was done while carrying out interviews and having informal conversations with various people in the office which facilitated the use of triangulation of different sources of data (Easterby-Smith,

Thorpe et al. 2002). For instance, the observed issues were cross checked at various occasions during latter visits to each research site particularly while drawing the Value Stream Maps of each office.

- The observations were overt observations and all the people in the research site knew about them as advocated by Patton (2002).

- An attempt was made to measure the behaviours that were not obvious to the observed workers (Graziano, Raulin 2007).

- The actual observations were related to various aspects of the office. These include: 1) The physical environment (e.g. understanding the physical layout of the office, any physical restrictions, and the technology systems). 2) The general atmosphere (e.g. including number of people, understanding interactions among individuals, the manager's visits and their activities during the visits, the rules and procedures, the frequency of the interaction between others, the interdependence between them, if they communicate with each other in a formal or informal way, and if the work atmosphere is stressful or pleasant).

In this case study, three sessions of direct observations were carried out to gather field notes on the same days of the first, second and third interviews. This is further explained in the Siemens case study data base shown in Appendix (N).

Various aspects of the Siemens case study office were observed, these include: 1) The physical environment (e.g. the office had an open layout without any physical restrictions and it used various types of IT systems to integrate between individuals). 2) The general atmosphere (e.g. the number of employees was seven, people interacted frequently and seemed to collaborate like a team, the manager's visits were very regular and there were few rules and procedures such as 5S, the interdependence between the employees tended to be based on team work, the way the employees communicated with each other was informal and the work atmosphere tended to be pleasant but under pressure). For more details on the

observed data, Table (6.2) presents the observed data from the Siemens case study office that is related to various issues and/or variables of the model.

6.2.2.3.   Documents

Documents were collected from the manager. They included catalogues to gain general understanding about the organisation, its products and market. An internal report was also provided by one of the employees of the office. This employee was involved in the group interview related to drawing the current state value stream maps of the office. He gave an internal report which explained how the conventional form of value stream mapping was used in the Siemens office.

6.2.3 Data Analysis

As mentioned earlier in section 5.2.2 in Chapter 5, two general strategies were used to collect and analyse data of the model as advocated by Yin (2003) and Yin (2009). These are: 1) To depend on the conceptual model of this study in shaping the data collection plan, which led to this study (Yin 2003). Consequently, the interview protocol was designed in such a way that it was guided by the various steps of the model with questions which answered each stage sequentially. As mentioned earlier, this was done using pure qualitative research. 2) To examine rival explanations from rival theories (Yin 2003, Yin 2000). For instance, rival explanations were particularly used to qualify or disqualify any superfluous variables from the model being tested, as shown in section 6.2.6.

Since there is no general method for analysing qualitative data (Miles, Huberman 1994), the analysis method considered appropriate to analyse the data captured within the various stages of the model was Quasi-quantification (Bryman, Bell 2007). In this analysis method, terms such as 'frequently', 'many', 'some, 'a little', 'often' and 'rarely' etc were used to enable the researcher to make allusions to quantity (Bryman, Bell 2007).

Bryman and Bell criticised the quasi-quantification analysis method for being imprecise and the fact that it is usually hard to discern the reason for using it in an

argument (Bryman, Bell 2007). Consequently, it was considered that this limitation could be reduced by carrying out two actions: 1) Engaging in a limited amount of quantification whenever suitable by quantifying expressions or keywords that could support an argument (Bryman, Bell 2007). 2) Developing a methodology for analysing the captured data using a predefined list of quantifiable keywords as shown in Table (6.1). This list of quantifiable keywords was extracted from the natural language. It was considered to be the terms that would be more or less used by the respondent to support his/her argument. Table (6.1) illustrates how these terms were divided during the analysis in terms of a positive and a negative polarity. A summary of the results of the qualitative data analysis is shown in Table (6.2).

Table (6.1) illustrates various quasi terms used as keywords during the analysis of this case study.

Keyword Polarity	Examples of Keywords	Results of Analysis
Positive	Once in a while, infrequently, seldom, occasionally, on the odd occasion, once in a blue moon, from time to time, now and then, rarely, hardly, hardly ever, barely, small, faintly, to some extent, somewhat, slightly, a little, a little bit, fairly, moderately, reasonably, quite, pretty, pretty much, very, highly, above average, large, vastly, well, huge, gigantic, enormous, big, extremely, considerably, exceedingly, very much, confidently, greatly, strongly, a lot, a great deal	It reinforced the characteristic of the adjective which supported a specific argument
Negative	Not too, not so, not enough, not sufficiently, not very, not much, not, neither, nor	It suggested the opposite characteristic of the adjective which supported a specific argument

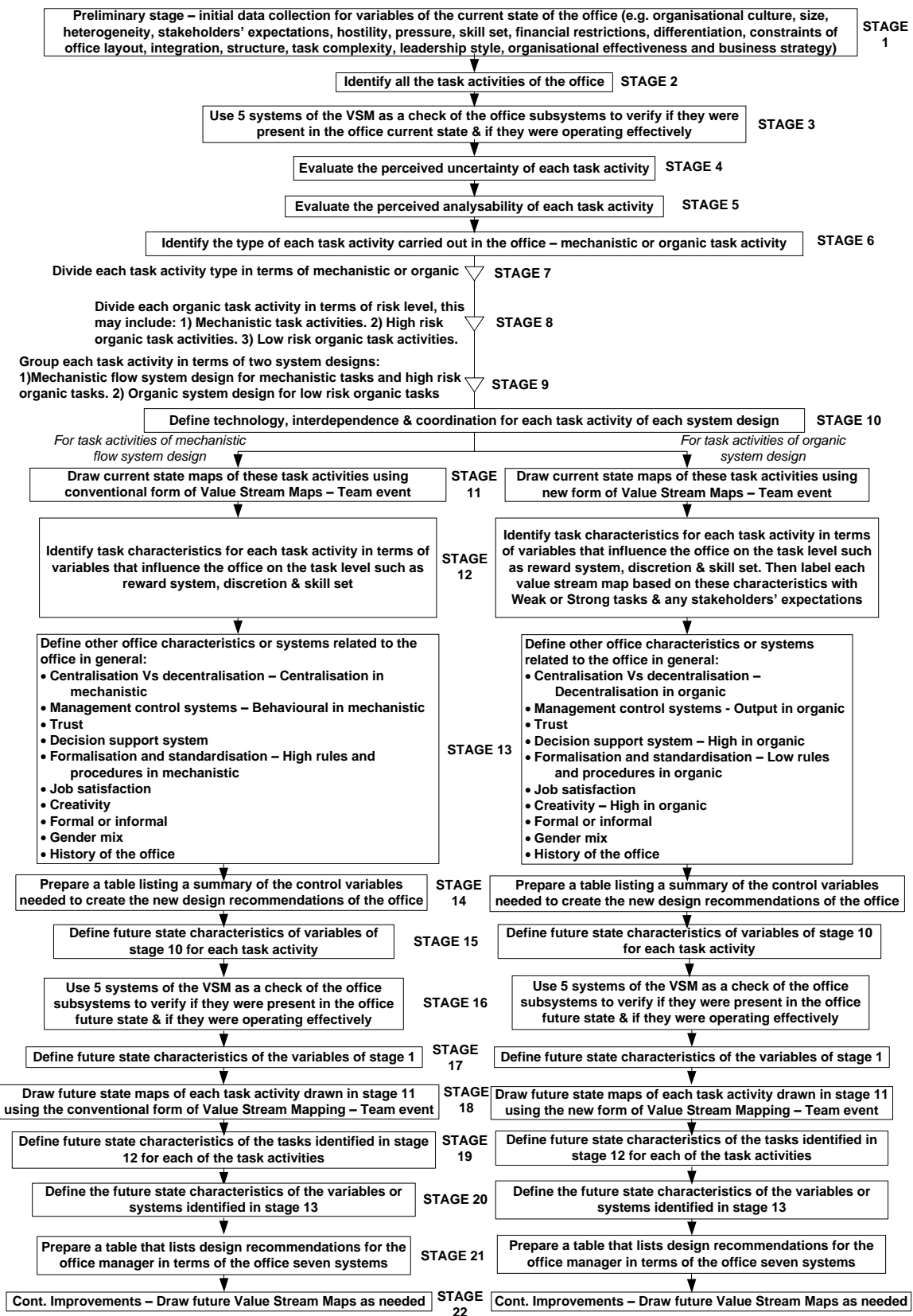A sample of the analysis method used is presented below:

The manager of the office described the heterogeneity of the office by stating:

"The office has various amounts of services… its quite varied in that way. Okay… the nature changes a lot… every area is different…"

Source: The new manager of Siemens on 11/1/2006 as shown in Appendix (N).

The key word 'quite' reinforces the fact that the services of the office were varied. In addition, the key word 'a lot' suggests that the nature of the services of the office keeps on changing. Based on this it is concluded that the office services are heterogeneous.

Figure (6.1) shows a conceptual model that was tested using Siemens study.

Preliminary stage – initial data collection for variables of the current state of the office (e.g. organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, constraints of office layout, integration, structure, task complexity, leadership style, organisational effectiveness and business strategy) — STAGE 1

Identify all the task activities of the office — STAGE 2

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively — STAGE 3

Evaluate the perceived uncertainty of each task activity — STAGE 4

Evaluate the perceived analysability of each task activity — STAGE 5

Identify the type of each task activity carried out in the office – mechanistic or organic task activity — STAGE 6

Divide each task activity type in terms of mechanistic or organic — STAGE 7

Divide each organic task activity in terms of risk level, this may include: 1) Mechanistic task activities. 2) High risk organic task activities. 3) Low risk organic task activities. — STAGE 8

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for mechanistic tasks and high risk organic tasks. 2) Organic system design for low risk organic tasks — STAGE 9

Define technology, interdependence & coordination for each task activity of each system design — STAGE 10

For task activities of mechanistic flow system design | *For task activities of organic system design*

STAGE 11

Left	Right
Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event	**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**

STAGE 12

Left	Right
Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set	**Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set. Then label each value stream map based on these characteristics with Weak or Strong tasks & any stakeholders' expectations**

STAGE 13

Left	Right
Define other office characteristics or systems related to the office in general: • Centralisation Vs decentralisation – Centralisation in mechanistic • Management control systems – Behavioural in mechanistic • Trust • Decision support system • Formalisation and standardisation – High rules and procedures in mechanistic • Job satisfaction • Creativity • Formal or informal • Gender mix • History of the office	**Define other office characteristics or systems related to the office in general:** • Centralisation Vs decentralisation – Decentralisation in organic • Management control systems - Output in organic • Trust • Decision support system – High in organic • Formalisation and standardisation – Low rules and procedures in organic • Job satisfaction • Creativity – High in organic • Formal or informal • Gender mix • History of the office

STAGE 14

Left	Right
Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**

STAGE 15

Left	Right
Define future state characteristics of variables of stage 10 for each task activity	**Define future state characteristics of variables of stage 10 for each task activity**

STAGE 16

Left	Right
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**

STAGE 17

Left	Right
Define future state characteristics of the variables of stage 1	**Define future state characteristics of the variables of stage 1**

STAGE 18

Left	Right
Draw future state maps of each task activity drawn in stage 11 using the conventional form of Value Stream Mapping – Team event	**Draw future state maps of each task activity drawn in stage 11 using the new form of Value Stream Mapping – Team event**

STAGE 19

Left	Right
Define future state characteristics of the tasks identified in stage 12 for each of the task activities	**Define future state characteristics of the tasks identified in stage 12 for each of the task activities**

STAGE 20

Left	Right
Define the future state characteristics of the variables or systems identified in stage 13	**Define the future state characteristics of the variables or systems identified in stage 13**

STAGE 21

Left	Right
Prepare a table that lists design recommendations for the office manager in terms of the office seven systems	**Prepare a table that lists design recommendations for the office manager in terms of the office seven systems**

STAGE 22

Left	Right
Cont. Improvements – Draw future Value Stream Maps as needed	**Cont. Improvements – Draw future Value Stream Maps as needed**

6.2.4 Applying Siemens Case Study to the Model – Results and Data Analysis

The aim was to use this case study to populate the model, so that it can be tested by following its methodology of implementation step by step. It was carried out by following the various steps of the model as shown in Table (6.2).

Table (6.2) shows evidence and analysis of the gathered triangulated data needed to populate the conceptual model using the Siemens case study. It also presents the evidence gathered from the triangulated sources of data (e.g. interviews, observations and documents).

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 1	Size	Since the number of the employees is less than 50, the size of the office size is small. This was concluded from both observations and manager's view. **MANAGER'S ANSWER:** *"Seven employees including me"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office is small as it consists of six internal consultant employees who share one big area located in a way that faces the manager who sits in his own cubical
Stage 1	Heterogeneity	Heterogeneity level for the office's products was confirmed to be high from the field notes of the observations of the office, the purpose statement found in the Business Plan Deployment Pack Report and the interview with the manager. **MANAGER'S ANSWER:** *"… We have four products that we manufacture here which are pretty much similar and but there is another few ones in a site here and few others in Germany... it's all about the range of mega bytes within the gas turbine business."* In addition, the heterogeneity level of the office services was described as quite variable. The manager states: • *"The office has various amounts of services… its quite varied in that way. Okay… the nature changes a lot… every area is different…"* • *"If we did six sigma projects or complex process work… testing the engines, those projects will go on for most years and their problems vary too. But in six sigma projects, you use completely different tools, different problems, because, the thing about six sigma… we use it because we totally do not know the solution, although you might know what the problem is. Okay… every situation that you go into is different because most of the time we do not know what the problem is as it can vary"* • *"…So it's quite variable, you do know what service you are going to do. So the fact that the services are extra variable, it means that extra support is needed."*
		TRIANGULATION USING OBSERVATIONS: It was observed that office is an internal consulting office, which provides solutions for various parts of the organisation
Stage 1	Leadership style	Both the observations and manager's view suggests that the situational leadership adopted in the current state is Delegating. By referring to situational leadership, the manager described the old employees of the office to have high readiness level (R4) and the new employees of his office to have low-moderate readiness level.

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		MANAGER'S ANSWER: *"… The old employees are probably like R4… and the new employees are more like R2."* In addition, he described the leadership style that he uses in the office current state as: *"Basically, I do a bit of coaching for the new employees, I pretty much show them how to do their job and help them in taking decisions until they know how to do it on their own, so this is more like Selling leadership style… for the old employees I use a little bit of dictation, and a lot of delegation but I still give them a lot of support and validation when they need it or once the project is finished... So it is more like Delegating leadership style"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the manager is available in a very informal way and frequently interacts with the employees face to face or in group meetings held in discussion rooms located in the office but segregated using cubicles
Stage 1	Stakeholders' expectations	**MANAGER'S ANSWER:** The manager states that the stakeholders' expectation imposed by the executives of this office are: "*The expectations imposed by the executives are obviously safety, so the guys have to be safe working... time, quality, volume and creativity... Actually, quality is one of the biggest drivers more than probably time"* In addition, the manager states that the customer expectations of this office are: *"… The customers of the office probably expect fast service to the highest quality…"*
Stage 1	Organisational effectiveness & business strategy	**MANAGER'S ANSWER:** The manager states that the purpose of the office is: *"…provide state of the art tools for the business and the organisation as whole so that they can improve their performance in the short and long term"* The manager states that the business strategy is: *The customer probably do not have full understanding all the time of what we are or are not supposed to do, but in general terms, all the projects that allocated to us, we actually have a say explaining how long it's gonna take and all type of things, so we keep in contact with them."*
Stage 1	Organisational culture – Competing Values Framework	Both interviews and observations confirm that the type of Competing Values Framework is clan. **MANAGER'S ANSWER:** *"I think it is clan"* In addition, the manager described the current state of the office as: *"It probably tends to be an office with unpredictable nature, for example, I do a lot of delegation and for this the people need to have discretion and flexibility as long as they achieve the project's deliverables…"* *"I think the focus in this office is pretty much internal to achieve unity and collaboration between the employees because it is essentially teamwork"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office serves other internal parts of the organisation, a sense of collaboration and team work was also observed from the constant interaction between people
Stage 1	Organisational culture –Shared values	The manager listed the shared values of the office: *"I think there are an identifiable set of cultural values and beliefs… safe working... quality, time and then volume..."* In addition, it is suggested that the cultural strength of the office is weak, because the manager describes the resistance of the employees to change as:

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		"It would be pretty low resistance to change….It's never represented a problem…"
		TRIANGULATION USING OBSERVATIONS: It was observed that people seem to share collaboration as one of its values
Stage 1	Hostility	Both observations and interviews suggest that hostility have little effect on this office. **MANAGER'S ANSWER:** *"We are basically the internal consultants for the company ... So we do not have any competitors"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office is an internal consultancy, where people value collaboration and team work as the office which does not have any competitors
Stage 1	Pressure	Both interviews and observation confirms that the level of pressure experienced by the employees tends to be pretty high. **MANAGER'S ANSWER:** The manager described the percentage of time when the employees are working compared to the percentage of time when they are not working as: *"It is pretty low, they always have tasks... as soon as a project is finished, they come to me and I give them a new task"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the people seem to be under constant pressure and busy all the time
Stage 1	Task complexity	Both interviews and observations confirmed that the tasks of the office tend to be complex. **MANAGER'S ANSWER:** *"…the jobs are highly complex..."*
		It was observed during drawing the current state value stream maps in stage 11 that the tasks of the task activities of the office tend to be complex as black boxes were used to represent the complex ones.
Stage 1	Task complexity - variety	Both interviews and observations confirmed that the tasks of the office tend to be variable. **MANAGER'S ANSWER:** *"The variety in the tasks is high..."*
		TRIANGULATION USING OBSERVATIONS: When the current state value stream maps were being drawn in stage 11, the tasks of the office were described, while having an informal conversation with one of the employees, as tasks with high level of variety
Stage 1	Skill set	Skill set required to carry out the tasks of the office has been described as high. **MANAGER'S ANSWER:** *"…there is a big emphasis on high skills and professionalism"* In addition, the manager described the level of training required to be taken by the employees of the office as: *"Fairly often I would say... formal training... I think it's definitely a few times throughout the year... and your informal training is everyday... usually there is something new every day..."*
Stage 1	Financial restrictions	**MANAGER'S ANSWER:** The manager described the financial restrictions on the projects of the office as: *"…the restrictions on them are low…"*
Stage 1	Differentiation	Both interviews and observations confirmed that the office is differentiated within the organisation using a matrix structure. **MANAGER'S ANSWER:** The manager described the form of differentiation used for various groups or department as: *"It is matrix, In general, it is a mix of either manufacturing groups, managing directions, managers, or even by speciality"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office was differentiated from the rest of the organisation by having its own structure and physical entity
Stage 1	Constraints of office layout	Both interviews and observations confirmed that there is no physical constraints in the office

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		MANAGER'S ANSWER: *"…we do not have any physical constraints..."*
		It was observed that the office layout is:
Stage 1	Integration	Both interviews and observations confirmed that the level of integration is high. **MANAGER'S ANSWER:** The manager described the needed level of alignment between office goals and organisational goals as: *"It is very high"* In addition, described the importance of having integration & high level of collaboration in the office as: *"To be able to do the job effectively, communication between us is very important and high because an employee might require coaching, help & support"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office have two discussion rooms that are used to ensure that people are integrating with each other properly, in addition the office had an open layout without any segregators to ensure integration between people. It was also observed that various technological systems were used to allow people to communicate with each other within the organisation.
Stage 1	Structure	Both interviews and observations confirmed that the structure of the office is flat. **MANAGER'S ANSWER:** The manager described the structure of the office as: "flat"
		TRIANGULATION USING OBSERVATIONS: It was observed that the office had one manager, which made the structure look like this:

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 2	Identify task activities of the office	**MANAGER'S ANSWER:** The manager listed the task activities of the office as shown below: Training Process (runners 45%), Business Improvement Request for Support - Tools and Techniques (Repeaters 30%), Lean Assessment (Repeaters 20%) and other admin work (strangers 5%)
Stage 3	Viable System Model – office current state	All systems of the VSM were identified without any task activities that are liable on the system or provide no value. The manager also pointed out that there are no task activities that add no value to the office. The existence of all VSM systems was confirmed in manager's interview. At the same time, field notes of direct observations confirmed systems one, two and three star were used in the office. System one consists of three task activities, for more details see value stream maps of the office shown in Figures (6.2, 6.3 & 6.4). System 2 exists in the office current state in various forms; these include the method used for task allocation and the coordination modes used in the office. **MANAGER'S ANSWER:** This was depicted as the manager described how people are allocated and coordinated in the office as: • *"They have tasks which are allocated individually by myself and tasks that are allocated in common as well by myself..."* • *"Normally, the tasks are not as specific as for a particular team, its normally are more extended tasks supporting a specific department, that could be part of the person's responsibility (of one person)...So it could be the responsibility of one person to support a department, but obviously any task that derives or comes from that project would be carried out by different people or by the team or together…".* • The manager also states *"it normally involves a team... So there's normally a communal task... and then a lot of work is actually done in interaction, so its team work..."* • In addition the *manager* states, *"We mutually adjust to the changes of the other... a little bit of rules and definitely team work."* System 3 exists in the office in the form of a planning system, which is formed by a senior manager as well as the manager of the office. **MANAGER'S ANSWER:** *"... We have a planning system; it consists of both Lean Assessment, which is like a yearly plan carried out with senior executives and myself.... We also have weakly reviews, which are more like a weekly plan to achieve the targets of the lean assessment. The weekly plan is done for each project separately by the employee who carries out the project and myself... I'll show you how this works..."* System 3* also exists in the office. **MANAGER'S ANSWER:**

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		"...Yah you have to observe people, it's difficult not to but there is also a target setting agreement for the output. It is done during the weakly review of the lean assessment… it is a weekly plan to achieve the targets of the lean assessment, the weekly plan is done for each project separately by the employee who carries out the project and monitored by myself... *We have two assessments carried out by a senior manager, one for the department as a whole in which you can get a score and then the other assessment is related to your individual contribution... performance... and their progress against the plans of their allocated projects as well as of course the department they support. These scores can be used to reward the employees, training and development, planning purposes as well.* *On the other hand, there are a little bit of rules introduced to the office such as the 5S which is an advantage for introducing control, as those set or rules are not just imposed they are also developed by the team which means they can reinforce them themselves. The office is assessed by an employee of the office in terms of these 5S rules and given a monthly score that they try to continuously improve.* *… there is always a weekly meeting that evaluates and rewards people within the office… we care about meeting there, because everybody has to tell what they have been doing each week, and the end of the week, we tell the rest of the team what we have working on…"* *We take customer feedback, which is from the shop floor… based on their output and how well they support the department or lead the project.* System 4 exists in the office current state in the form of customer feedback received by the manager. **MANAGER'S ANSWER:** The manager described the main external factor(s) used to gather external information that may change or improve the way the office work as: *"… The customer feedback is the main factor... I receive it"* System 5 exists in the office in the form of policy or purpose and is set by the executives of the organisation. **MANAGER'S ANSWER:** *"The business excellence department is basically divided into different sections; our section is about business improvement. So it's set by the executives to provide state of the art tools to the business so that they can improve their performance in short and long term."*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office had system one through its activities and operations carried out by each employee. In addition, it was observed that schedules were used in the office in the form of a rota for certain tasks such as coordinate how to carry out 5S (i.e. lean technique) for the office. In addition, it was observed that the manager used to monitor people as his office was facing all employees.

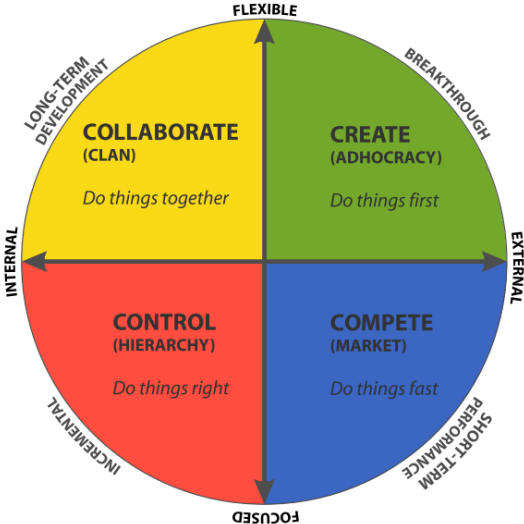| Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 4	Uncertainty components	Input environmental uncertainty of the office is low. **MANAGER'S ANSWER:** *"The data accuracy... it probably would be the variability of the data as well... it is highly variable, however, I think it is very predictable..."* In addition, the manager described how the rules of external parties that influence the office change as: *"These rules do change but they are quite predictable... we normally get a few years warning.... so we get time to adjust the procedures"* Unpredictability in the task operation uncertainty exists in the office as suggested from both interviews and observations. **MANAGER'S ANSWER:** The manager described the sources of task uncertainties are related to: *"Resources could one... the resources in general... money... how we gonna get the money for the project, how we gonna have the human resources as well... the workforce to be able to develop that idea for that project, Potentially could be as well the skill set"* Output environmental uncertainty of the office is low, **MANAGER'S ANSWER:** The manager described the customer demand uncertainty as: *"It gonna be constant... with time the demand grows The projects normally are pretty the same, but the project means that the first few month on the project, the demand is pretty low and as the project develops the demand normally increases"* In addition, the manager described the uncertainty of the task output as: *"Potentially… the benefit or the outcome… I think the amount of uncertainty in the task outputs is generally pretty low uncertainty, we kind of manage that… so that the risk is minimal, it's part of the process of keeping the funding… our credibility will be low if we will not be able to make our targets"* **TRIANGULATION USING OBSERVATIONS:** It was observed during drawing the current state value stream maps in stage 11 that the tasks of the office tend to be predominantly unpredictable
Stage 5	Task analysability	Both interviews and observations confirmed that task analysability is low. **MANAGER'S ANSWER:** *"…most of the tasks involve pretty low analysability."* It was observed during drawing the current state value stream maps in stage 11 that the tasks of the office tend to have low analysability as difficulties arose while attempting to break them down into smaller tasks
Stage 6	Identify task activity type – Mechanistic or organic	**MANAGER'S ANSWER:** The manager identified the type of each task activity in terms of mechanistic and organic, as shown below: Business Improvement Request for Support is organic, Lean Assessment is organic and Training Process is organic.

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 7	Divide the task activities of the office in terms of mechanistic & organic	**MANAGER'S ANSWER:** The manager states that the office consists of organic task activities only.
Stage 8	Divide the task activities in terms of risk	All task activities are with low risk, which means that all task activities of the office are organic with low risk. **MANAGER'S ANSWER:** The manager states there are not any high risk tasks that could cause a threat to the lives of others or to the viability of the organisation.
Stage 9	Group task activities in terms of the two system designs	**MANAGER'S ANSWER:** There are only low risk organic task activities (e.g. Training Process, Business Improvement Request for Support - Tools and Techniques, Lean Assessment, which will be designed using an organic system design.
Stage 10	Interdependence, technology & coordination	Both observations and interviews suggest that the interdependence of all task activities is team. **MANAGER'S ANSWER:** The manager explained the manner of working between people as team, which means that interdependence tends to be team: *"There is definitely team working involved between people inside the office in all cases, so it is very similar to team interdependence."* Other Malone, Crowston et al.'s (1999) dependencies, which exist in the current state of the office, are sharing dependency, fit dependency and simultaneity constraint dependency. **MANAGER'S ANSWER:** • Sharing dependency as the manager states: *"So there's normally a communal task"* • Fit dependency as the manager states: *"…there is a mix of coaching and delegating which is normally what I say... When I have people that have been in the department for longer years, it's a lot more of delegating"* • Simultaneity constraint dependency as the manager states: *"it's not just a team that do a set of tasks and you go away and do them... you have to do them together.... so that's probably as I far as I can go really on that question..."* Interviews suggest that the technology of all task activities is intensive, which does not conflict with the observations. **MANAGER'S ANSWER:** Technology type in the office is not Long Linked, because: 1) The task sequence of the process carried out is not sequential. 2) The input comes from the same place the output goes to. As manager states *"...ninety or eighty percent of our work is with the manufacturing areas".* Also the manager states *"My output goes… eighty to ninety percent to manufacturing…"* This argument also suggests that the technology is not mediating, because there are not any clients or customers with complementary needs. This means that the office technology is Intensive. **MANAGER'S ANSWER:** The technology systems used in the office are described by the manager as: *"Telephone as well... and mobiles as well... and ... fax as well! All the normal equipment in a normal office... computer systems and computer network... as well..."* **MANAGER'S ANSWER:** The Coordination modes used in the office are explained by the manager as follows: • It is concluded that Managerial Decision are used as a coordination mode in the office, because the manager states: *"They have tasks which are allocated individually by myself and tasks that are allocated in common as well by myself..."* AND *"…there is a mix of coaching and delegating which is normally what I say... It depends when I have new employees; it's*

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		a lot of coaching... When I have people that have been in the department for longer years, it's a lot more of delegating. So when there is uncertainty in taking the task I implement taking the decision" • It is concluded that task decomposition are used as a coordination mode in the office, because the manager states: *"Normally, the tasks are not as specific as for a particular team, its normally are more extended tasks supporting a specific department, that could be part of the person's responsibility (of one person)...So it could be the responsibility of one person to support a department, but obviously any task that derives or comes from that project would be carried out by different people or by the team or together…".* • It is concluded that Team work are used as a coordination mode in the office, because the manager states: *"it normally involves a team... So there's normally a communal task... and then a lot of work is actually done in interaction, so its team work..."* • In addition, it is concluded that mutual adjustments are used in the office, because the manager states, *"we mutually adjust to the changes of the other... a little bit of rules and definitely team work."*
		It was observed that people communicated with each other randomly as needed without being restricted to a certain pattern. It was also observed that various coordination modes were used such as schedules, team work, face to face discussions, unscheduled meetings, interdepartmental teams and direct supervision
Stage 11	Draw Value Stream Map of each task activity of the office – current state	<u>**THE ANSWER OF A TEAM CONSISTING OF THE MANAGER AND THREE OTHER EMPLOYEES:**</u> See Figures (6.2, 6.3 & 6.4). The organic with low risk task activities (i.e. Training Process, Business Improvement Request for Support - Tools and Techniques, Lean Assessment were drawn using the new form of value stream mapping
		<u>**TRIANGULATION USING DOCUMENTS:**</u> :A document in the form of an internal report were given by one of the employees, as it provides an example of how the conventional form of value stream mapping is used in the office.
		<u>**TRIANGULATION USING OBSERVATIONS:**</u> Various observations were taken about various tasks of the office while having informal conversations with the employees who were involved in the team activities for drawing the Value Stream Maps of the current state of the office.

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 12	Define characteristics of tasks of each task activity of the office in terms of reward system, discretion, skill set & weak or strong.	The skill set required for each of the task activities of the office is high. **MANAGER'S ANSWER:** The manager described the required level of training as follows: *"Fairly often I would say... formal training... I think it's definitely a few times throughout the year... and your informal training is everyday... usually there is something new everyday... So there is a big emphasis on high skills and professionalism for all task activities of the office"* The discretion level required for each of the task activities of the office is above average. **MANAGER'S ANSWER:** The manager described the required level of discretion as follows: *"I think it probably would be above average for all task activities of the office, there is obviously certain things that we need to conform to from the central office"* The reward system for the task activities of the office is monetary and obtainable. **MANAGER'S ANSWER:** The manager describes the reward system as *"We have an appraisal system and that's for any employee... and the performance of the employee in all his task activities affects the money that person gets every year"* In addition the manager states, *"We have two assessments, one for the department as a whole in which you can get a score and based on that you get certain amount of money and then the other amount of money comes from your individual contribution"* The characteristics of the four variables in each task activity of the office were defined. For instance, task operation uncertainty is high, skill set is high, discretion is above average and reward system is obtainable. Consequently, the office is considered to consist of weak task activities.
Stage 13	Centralisation vs. decentralisation	The office is considered to be decentralised. **MANAGER'S ANSWER:** The manager described the discretion level used by the employees of the office in all their task activities as: *"I think it probably would be above average for all task activities of the office, there is obviously certain things that we need to conform to from the central office"*
Stage 13	Management control systems	Both observations and interviews confirmed the types of management control systems used in the office. **MANAGER'S ANSWER:** *"You have to observe people, it's difficult not to but there is also a target setting agreement for the output."* *"...there is also a target setting agreement for the output. It is done during the weakly review of the lean assessment… It is a weekly plan to achieve the targets of the lean assessment, the weekly plan is done for each project separately by the employee who carries out the project and monitored by myself…"* *"We have two assessments carried out by a senior manager... These scores can be used to reward the employees, training and development, planning purposes as well. On the other hand, there are a little bit of rules introduced to the office such as the 5S which is an advantage for introducing control, as those set or rules are not just imposed they are also developed by the team which means they can reinforce them themselves. … there is always a weekly meeting that evaluates and rewards people within the office… we care about meeting there, because everybody has to tell what they have been doing each week, and the end of the week, we tell the rest of the team what we have been working on…"* *"We take customer feedback, which is from the shop floor… based on their output and how well they support the department or lead the project."* **TRIANGULATION USING OBSERVATIONS:** It was observed that the

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		manager controls the employees by directly observing them
Stage 13	Formal & informal	Both interviews and observations confirmed that the office is informal. **MANAGER'S ANSWER:** *"I think it is pretty informal…"*
		It was observed that the office is informal as people seem to take to each other freely
Stage 13	Trust	Both interviews and observations confirmed that the trust level in the office is high. **MANAGER'S ANSWER:** The manager described the office as: *"…with a high level of trust"*
		TRIANGULATION USING OBSERVATIONS: It was observed that people were in rapport with each other, they were friendly and actively showed interest in helping each other
Stage 13	Decision support systems	The manager states that DSS are not used in the office current state.
Stage 13	Formalisation & standardisation	Both interviews and observations confirmed that the formalisation and standardisation level in the office is low. **MANAGER'S ANSWER:** *"… No… the office does not have any rules related to the method used to carry out the tasks of the office, however, few 5S rules are used in the office and they are not related to the method used to carry out the tasks"*
		TRIANGULATION USING OBSERVATIONS: It was observed that little rules were in the office as people seemed to behave freely and openly
Stage 13	Job satisfaction	Both interviews and observations confirmed that job satisfaction level in the office is good. **MANAGER'S ANSWER:** *"....in general I like my job a lot and I think that other employees do too"* In addition, the manager was asked if his office is significant and cannot be outsourced to other companies or not and he answered: *"They definitely not able to outsource it... And I think... I have to say it's critical to the organisation and the way organisation wants to do it..."* In addition, the manager was asked how friendly are the people in your office and he said: *"I think quite friendly… we never had any tension between anyone in the office"* In addition, job satisfaction is considered to be good due to the current conditions of having big emphasis on skill set and training, people centred office, participative leadership, above average level of discretion and having work group including team work as well as manager's support and safe working condition.
		TRIANGULATION USING OBSERVATIONS: It was perceived that general atmosphere of the office to be positive
Stage 13	Creativity	Both interviews and observations confirmed that the required level of creativity in the office is high. The answer of the manager below indicated that he promotes creativity in the current state of the office by doing the following: 1) Make the employees feel as if they are in a mission. 2) Help the employees to believe in the importance of their work. 3) To positively challenge the employees. 4) To indicate the importance of having equally creative thinking in identifying problems and exploring ideas. **MANAGER'S ANSWER:** *"far too creative, you have to be far too creative, pretty too creative, you have to be very creative…in terms of bringing new solutions, new ideas, new processes, it's pretty important that is why this office called business excellence"* In addition, the manager described the way he promotes creativity in the office as follows: *"What I do as a manager to improve creativity…. Basically speaking, best practice visits, lots of training and different external training courses, visits,*

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
		apply best practices of Siemens…, we have to take Siemens best practices out, and create it to work and fit in our culture here, for here exactly, it does not matter where you were, we have to think outside the box, we have to do it differently…" *"We have to put a lot of pressure on the employees and the whole team, it is very busy here… we have to be creative ourselves and we have to get them to be creative more than we are…, it does not matter who you work with, we are not the expertise in what they do… what we have to do is to be creative to get them to be creative to come back with ideas…"* *"They have to come here, do their work, do their day job seriously and responsibly, then they go home, they need to know why do we need to do it, and what is in it for me… importance of the job…"*
		TRIANGULATION USING OBSERVATIONS: It was observed that people were very focused and taking their job seriously. It was also observed that creativity is very important in the office because it is an organic internal consulting office
Stage 13	Gender mix	Both interviews and observations confirmed how irrelevant gender mix to the office design. **MANAGER'S ANSWER:** *"We do not have any restrictions on this gender ratio and do not require any support for it….Having women or men does not really matter at all as much as it is important to have the right person with the right abilities"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office had two females in office who were totally integrated with the rest of the employees
Stage 13	History of the office	There are no restrictions on the tenure of the office. **MANAGER'S ANSWER:** The manager describes the tenure of the office as: *"It pretty much ranges between one year and twenty five years."*
Stage 14	List of control variables	This list was gathered from the stages of the model related to the office current state:

Task activity	Variable	Level
Training Process	Task Complexity	High
	Task Uncertainty – input	Low
	Task Uncertainty – operations	High
	Task Uncertainty - output	Low
	Task Analysability	Low
	Risk	Low
	Mechanistic Vs Organic	Organic
Business Improvement Request for Support	Task Complexity	High
	Task Uncertainty – input	Low
	Task Uncertainty – operations	High
	Task Uncertainty – output	Low
	Task Analysability	Low
	Risk	Low
	Mechanistic Vs Organic	Organic
Lean Assessment	Task Complexity	High
	Task Uncertainty – input	Low
	Task Uncertainty – operations	High
	Task Uncertainty - output	Low
	Task Analysability	Low
	Risk	Low
	Mechanistic Vs Organic	Organic

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 15	Define interdependence, technology & coordination for the future state of each task activity of the office	Interdependence was defined for each of the task activities based on the characteristic of the value stream map in terms of both the nature of the office and whether the task activity is mechanistic or organic. After defining the recommended interdependence type, the recommended technology type in the office future state was also defined based on the interdependence type. Finally the coordination type recommended for the office future state was defined too by both Thompson's (1967) interdependence recommended in future state and Malone, Crowston et al.'s (1999) dependencies types existing in the current state of the office. The following characteristics are recommended: *See table below*

Task Activity	Interdependence Type	Technology Type	Coordination Type
Training Process	Team, sharing dependency, simultaneity constraints dependency & fit dependency	Intensive	Face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments, team work, "First come/first serve", priority order, budgets, managerial decisions, synchronisation goal selection, task decomposition.
Business Improvement Request for Support	Team, sharing dependency, simultaneity constraints dependency & fit dependency	Intensive	Face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments, team work, "First come/first serve", priority order, budgets, managerial decisions, synchronisation goal selection, task decomposition.
Lean Assessment	Team, sharing dependency, simultaneity constraints dependency & fit dependency	Intensive	Face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments, team work, "First come/first serve", priority order, budgets, managerial decisions, synchronisation goal selection, task decomposition.

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Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 16	Viable System Model – office future state	It was found that all five systems of the VSM exist in the office. In addition, there were no task activities or systems that were regarded as waste in the office. It is recommended to make new design recommendations for the coordination modes of system 2 and the management control systems of system 3* of the office. The coordination modes used in system 2 that are recommended to be used in the office future state were selected based on the types of Malone, Crowston et al.'s (1999) dependencies and Thompson's (1967) interdependence (Robey, Sales 1994) used in the office. These are: • It is recommended to manage team interdependence using coordination modes such as face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and team work. • It is recommended to manage sharing dependency using coordination modes such as "First come/first serve", priority order, budgets and managerial decisions. • It is recommended to manage simultaneity constraints dependency using coordination modes such as scheduling and synchronisation. • It is recommended to manage the fit dependency of the office using coordination modes such as goal selection and task decomposition. The recommendation of the management control systems of system 3* are based on whether the office consists of organic or mechanistic value stream maps, since the office consists of organic value stream maps only, the following management control systems are recommended for the future state of the office: • Control cultures are used in the current state of the office such as lean culture controls by observing the behaviour of the employees directly and introducing the 5S rules. Although 5S may seem as behavioural controls, which are not usually used for mechanistic offices. The 5S is considered to be suitable for the office future state too, because, it is actually used as clan controls, which reinforces the lean culture across the office. • Output controls are used in the current state in two forms. The first is prospects controls, which is regarded as a suitable recommendation for the office future state too. The second form of output controls used in the current state of the office is getting customer feedback, which is recommended to be a suitable recommendation for the office future state. It is recommended to also use product development information appraisals. These types of appraisals can monitor the levels of detail, customer related information and customer feedback, time related issues, resource inputs and cost. • Personnel controls are used in various aspects of the office current state such as training, culture, group rewards & socialisation. These are also recommended to be suitable choices for the future state. • Sophisticated integrative mechanisms are used in the office current state in the form of weekly meetings to increase its response, flexibility & adaptation. This is also regarded to be suitable recommendations in the office future state including having skilled task forces & meetings in team meeting rooms.

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 17	Organisational Culture of the office future state – Competing Values Framework	The characteristics of the office current state in terms of the Competing Values Framework, mainly two dimensions were also identified in the previous stages of the model as internal and flexible. Referring to the figure shown below, which illustrates the four quadrants of the Competing Values Framework, the recommended culture for the office future state is clan.
Stage 17	Organisational culture of the office future state – Shared values	The shared values are considered to be suitable for the future state of the office. Furthermore, the suitable culture strength for the office future state is weak, because the office consists of predominantly organic task activities with low resistance to change.
Stage 17	Leadership Style recommended for office future state	The following leadership style is recommended in the office future state: Selling S2 leadership style is recommended to be used to lead followers with low-moderate follower readiness level (R2) of the office, and Delegating leadership style is recommended to be used to lead followers with high follower readiness level (R4) of the office.
Stage 18	Draw future state value stream maps of each task activity of the office	This stage was not carried out to save the time of the busy employees and manager, as they showed their desire for drawing the future state maps by themselves at a later stage. This was considered suitable for two reasons: • The employees already had experience in creating future state value stream maps. • It was possible to carry out the next stages of the model without the need for the results of this stage.
Stage 19	Define future state characteristics of variables such as skill set, discretion, reward system & weak / strong	The recommended characteristics of skill set (Robey, Sales 1994), discretion (Robey, Sales 1994) and reward system (Galbraith, Downey et al. 2002) of each task activity depending on whether it is organic or mechanistic. Since all the task activities of the office are organic, the following is recommended:

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 20	Centralisation Vs decentralisation – office future state	It is recommended to keep the task activities of the future state of the office decentralised.
Stage 20	Management control systems – office future state	The following management control systems are recommended to be used in the future state of the office for all its value stream maps: Direct observations are used in the current state and recommended in the future state too. • Control cultures are used in the current state of the office such as lean culture controls by observing the behaviour of the employees directly and introducing the 5S rules. Although 5S may seem as behavioural controls, which are not usually used for mechanistic offices. The 5S is considered to be suitable for the office future state too, because, it is actually used as clan controls which reinforces the lean culture across the office. • Output controls are used in the current state in two forms. The first is prospects controls, which is regarded as a suitable recommendation for the office future state too. The second form of output controls used in the current state of the office is getting customer feedback, which is recommended to be a suitable recommendation for the office future state. It is recommended to also use product development information appraisals. These types of appraisals can monitor the levels of detail, customer related information and customer feedback, time related issues, resource inputs and cost. • Personnel controls are used in various aspects of the office current state such as training, culture, group rewards & socialisation. These are also recommended to be suitable choices for the future state. • Sophisticated integrative mechanisms are used in the office current state in the form of weekly meetings to increase its response, flexibility & adaptation. This is also regarded to be suitable recommendations in the office future state including having skilled task forces & meetings in team meeting rooms.
Stage 20	Formal & informal – office future state	It is recommended to keep the office as informal.
Stage 20	Trust – office future state	It is recommended to keep the same way used to handle trust in the current state.
Stage 20	Decision support system – office future state	It is recommended that the future state of the office may use Decision Support Systems.
Stage 20	Formalisation & standardisation – office future state	It is recommended to keep the level of formalisation and standardisation in the future state of the office as low.

Stage	Variable related	Manager's Answer / Direct Observations for various variables within the different stages of the model
Stage 20	Job satisfaction – office future state	No recommendations related to job satisfaction are made on the future state of the office. It is recommended to keep the same policy used in the office current state.
Stage 20	Creativity – office future state	The manager states that the required creativity level in the office is high. He also states that time pressure is high in the office. The manager already promotes creativity in the office current state by various means as shown in stage 13. According to Amabile, Hadley et al.'s (2002) pressure / time creativity matrix shown below, the measures taken by the manager to promote creativity in the office current state are also recommended to the office future state. However, it is also recommended to make the employees focus on their activities for a significant part of the day without being disturbed much, as deduced from the creativity matrix below: Source: (Amabile, Hadley et al. 2002).
Stage 20	Gender mix – office future state	Both interviews and observations confirmed how this variable is irrelevant to the way the work is carried out in the office and therefore is irrelevant to the office design. **MANAGER'S ANSWER:** *We do not have any bias and do not require any support for it… Having women or men does not really matter at all as much as it is important to have the right person with the right abilities"* **TRIANGULATION USING OBSERVATIONS:** It was observed that the office had a mix of men and women in it. The interaction between both genders seemed to be very friendly and relaxed. It was observed that the females were totally involved without any bias.
Stage 20	History of the office – office future state	It is recommended that the same policy regarding the employee tenure used in the current state of the office is going to be used also in the future state of the office.
Stage 21	Define design recommendations in terms of the 7 management systems of the office	See Table (6.3) in section 6.2.5

Stage 11 in Table (6.2) is related to the drawing the current state value stream maps for each task activity of the Siemens case study office. Since all the task activities of

the Siemens office (i.e. Training Process, Business Improvement Request for Support - Tools and Techniques, Lean Assessment) tended to have organic characteristics, the new version of value stream mapping was used to map them.

The reasons behind using action research while drawing the value stream maps of the office were explained within Section 5.2.2.2. The process of deriving and drawing the value stream maps, presented in Figures (6.2, 6.3 and 6.4), using action research within this model followed a standard procedure for all the case studies. This standard procedure is explained below:

- Drawing the value stream maps was carried out for each case study as part of action research. The researcher was involved with the team while drawing the value stream maps. The research ensured the participation of all the employees while drawing the maps step by step. In addition, maximum effort was put by the researcher to ensure that each member of the team fully understood the tool and knew how to appropriately use it along with all the tools involved within it.

- A team of employees was chosen by the manager of the office in order to map each task activity of the office.

- The value stream maps were drawn by carrying out interview meetings with the team.

- At the beginning of the meeting, a presentation was given to the whole team including the manager of the office. The aim of this presentation was to give these employees a brief training, which introduces the idea of using the conventional form of value stream mapping to draw the mechanistic task activities of the office along with the new form of value stream mapping to draw the organic task activities of the office. The employees of both case studies were already familiar with the use of the conventional form of value stream mapping within office domains, which was one of the reasons to select this case study.

- The new generation of value stream mapping was introduced to the employees of each case study. This involved explaining the various components and tools which are used within this new form of mapping. For instance, the use of the concept of the black box to represent complex tasks within a task activity was explained.

- The team meetings were carried out in a controlled quite environment.

Two interview meetings were conducted with the team to draw the value stream maps of the task activities of the Siemens case study case office. One of these meetings was carried out at Siemens Turbo-machinery ltd in Lincoln, UK. However the other one was carried out at Loughborough University, UK. For more information on these interview team meetings, please see the Siemens case study data base shown in Appendix (N).

At the end of these meetings the current state Value Stream Map of each task activity of the office was drawn. These are shown in Figures (6.2, 6.3 & 6.4). For more information or explanation of the various graphical icons used within the new generation of Value Stream Mapping, please see Appendix (I).

Figure (6.2) illustrates the current state value stream map of the training process task activity.
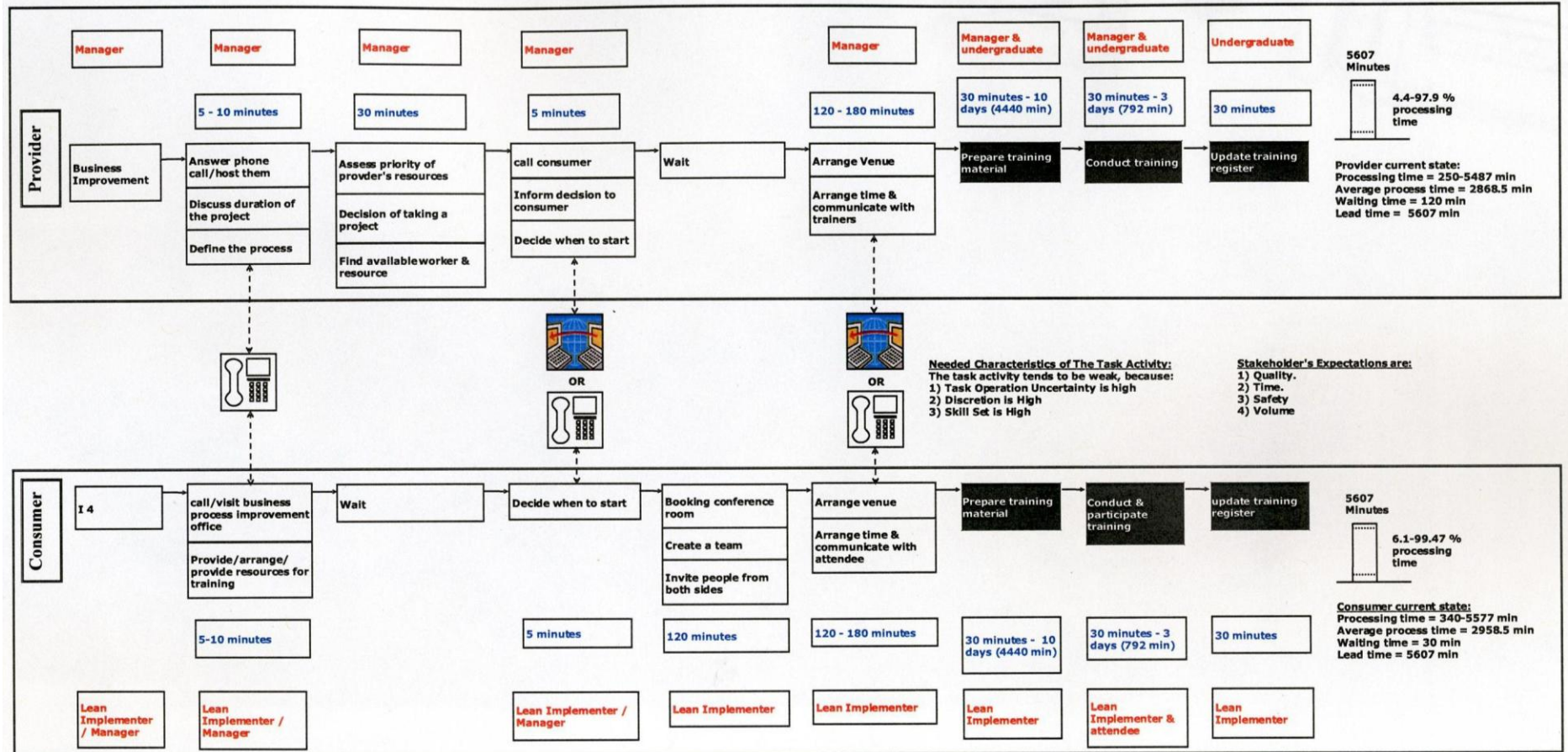
Figure (6.3) illustrates the current state value stream map of the business improvement request for support task activity.
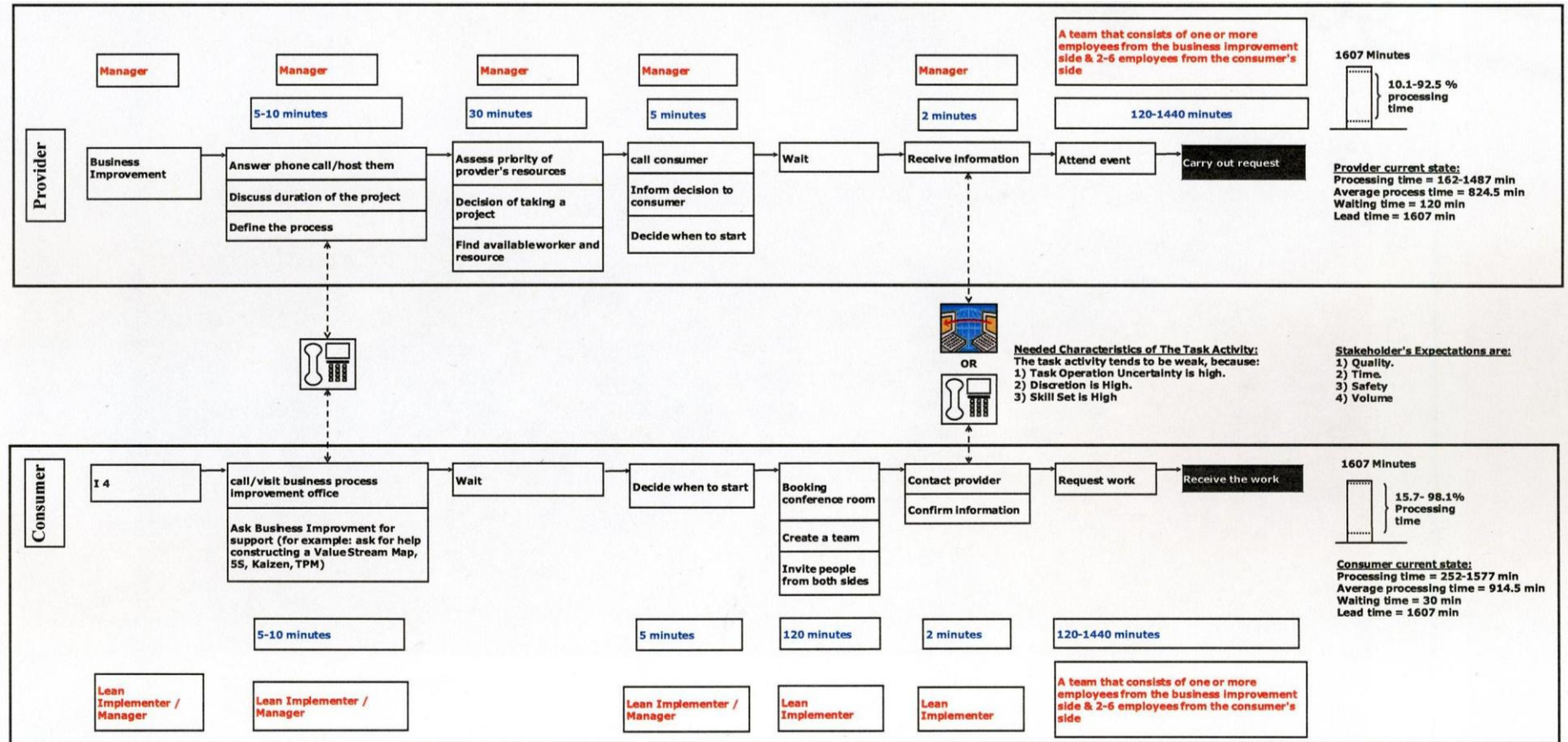
Figure (6.4) illustrates the current state value stream map of the lean assessment task activity.
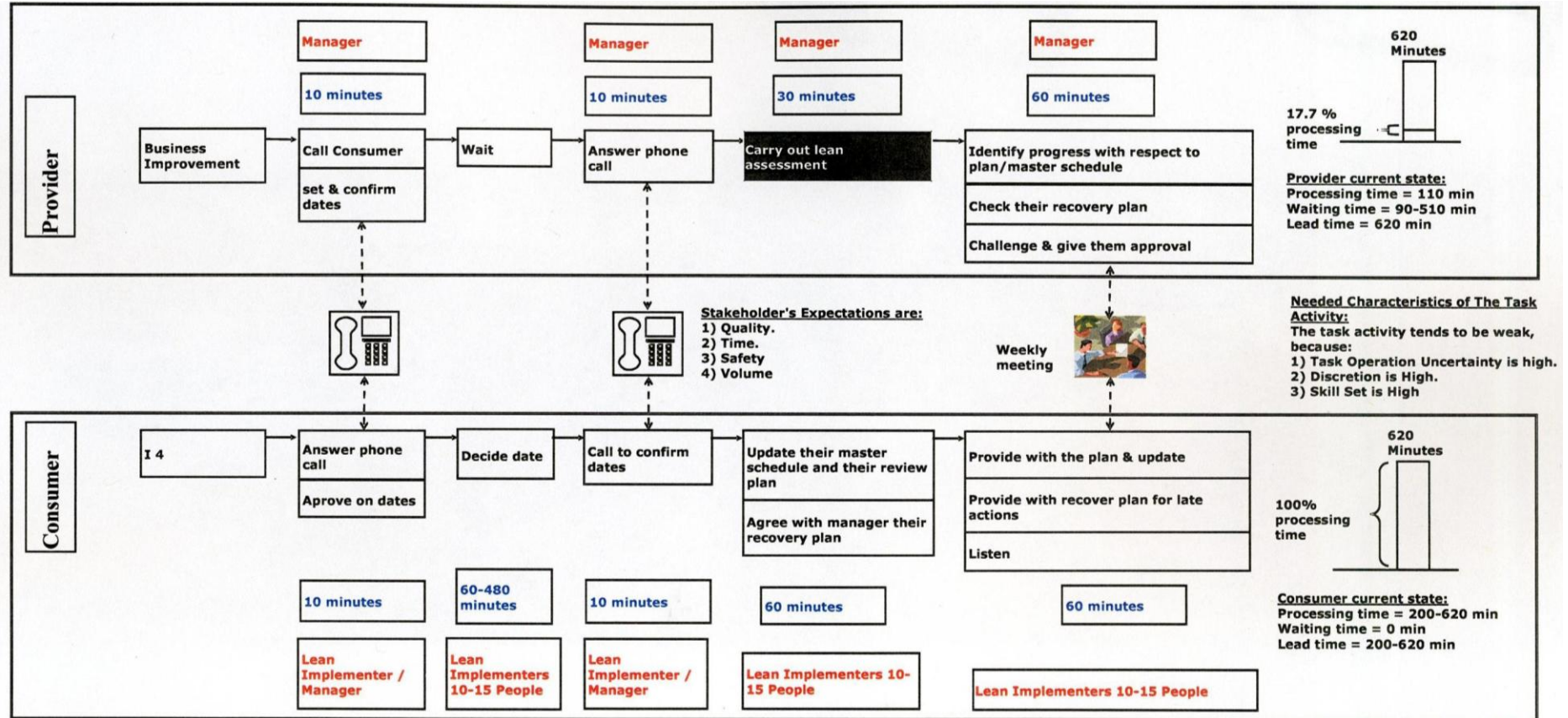
6.2.5 Model Results – New Design Recommendations for the Siemens Office

Table (6.3) illustrates the new design recommendations of the Siemens office, which resulted from applying the model to the Siemens case study. Table (6.3) presents the new design recommendations while showing a distinction between the current and the recommended future states of the Siemens office.

Table (6.3) illustrates a distinction between the current and recommended future states of the Siemens office. The new modifications to the office are presented below in *italic* text.

	Current state characteristics	**Recommended characteristics of future state**
Leadership Style	**The situational leadership style:** • Selling (S2) leadership style to lead new employees. • Delegating (S4) leadership style to lead old employees.	**The situational leadership styles recommended are:** • Selling (S2) leadership style to lead new employees. • Delegating (S4) leadership style to lead old employees.
Technology Characteristics	**Thompson's Technology Type:** • Intensive type of technology for each task activity of the office.	**Thompson's Technology Type:** • Intensive type of technology for each task activity of the office.
Employee Support	**Heterogeneity:** The products & services of the office are heterogeneous.	**Heterogeneity:** The products & services of the products of the office are heterogeneous. *This requires extra support to be given to the employees of the office future state.*
	Weak/Strong Situations: The task activities of the office are weak.	**Weak/Strong Situations:** The task activities of the office are weak. *This requires extra support to be given to the employees of the office future state.*
	Task Complexity: The task activities of the office are complex and variable. This is why there is an emphasis on skill set and training.	**Task Complexity:** The task activities of the office are complex and variable. *This requires extra support to be given to the employees of the office future state.*
	Organic/Mechanistic Nature: • All the task activities of the office are organic.	**Organic/Mechanistic Nature:** • All the task activities are organic. *This requires extra support to be given to the employees of the office future state.*

	Current state characteristics	Recommended characteristics of future state
Organising Activities / actors	**Coordination modes used are:** Team work, mutual adjustments, rules, face to face discussions, managerial decision and task decomposition	**Coordination modes used are:** • *Face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and/or team work.* • *"First come/first serve", priority order, budgets and/or managerial decisions.* • *Scheduling and/or synchronisation.* • *Goal selection and/or task decomposition.*
	Constraints of Office Layout: Open layout without any physical constraints.	**Constraints of Office Layout:** Open layout.
	Structure: Flat structure.	**Structure:** Flat structure.
	Organic/Mechanistic nature: All task activities of the office are organic.	**Organic/Mechanistic nature:** All task activities of the office are organic.
Planning Work Units	**Thompson's Interdependence:** The interdependence type used for the various task activities of the office is team	**Thompson's Interdependence:** To use team interdependence for the task activities of the office
	Value Stream Mapping tool: The current state value stream maps are shown in Figures (6.2, 6.3 & 6.4) for each task activity.	**Value Stream Mapping tool:** *It is recommended to create future state value stream maps.*
Assessing Individuals	**Management Control Systems:** • Control cultures such as lean culture controls by observing the behaviour of the employees directly and introducing the 5S rules. • Output controls are used in two forms: 1) Prospects controls. 2) Customer feedback. • Personnel controls such as training, culture, group rewards & socialisation. • Sophisticated integrative mechanisms in the form of weekly meetings, to increase its response, flexibility & adaptation.	**Management Control Systems for the office in general:** • Keep on using control cultures such as lean culture controls by observing the behaviour of the employees directly and introducing the 5S rules, because they are clan controls. • Use the following output controls: 1) Prospects controls. 2) Customer feedback. *3) Product development information appraisals. These types of appraisals can monitor the levels of detail, customer related information and customer feedback, time related issues, resources inputs and cost.* • Keep on using personnel controls such as training, culture, group rewards & socialisation. • Keep on using sophisticated integrative mechanisms in the form of weekly meetings, to increase its response, flexibility & adaptation.
	Reward System: • Two forms of monetary rewards are used for all employees of the office, these are: 1) Monetary rewards based on the performance of each individual employee. 2) Monetary rewards based on the performance of the employees of the whole department.	**Reward System:** *Instead of using mechanistic form of monetary rewards, It is recommended to use the following organic forms of reward systems:* • *Personnel rewards such as flexible 'cafeteria' benefits, lateral and upward promotions, equal opportunities, company score card, training, group rewards, socialisation, training and skilful employee of the month reward, and skills based monetary pay.*
Organisational Culture Characteristi	**Shared Values:** The organisational values of the culture of the office are safe working, quality, time and then volume. However, they are weak as there is a low resistance to change.	**Shared Values:** To keep the organisational values of the culture of the office with a weak strength, because the office is predominantly organic.

	Current state characteristics	Recommended characteristics of future state
	Competing Values Framework: Clan culture.	**Competing Values Framework:** To keep the culture as Clan.

6.2.6   Recommendations Made Following Testing the Model – Siemens Case Study

Figure (6.1) illustrates the steps of the conceptual model which were used to test the model using the Siemens case study. A new form of the model which was derived following its testing using the Siemens case study is shown in Figure (6.5). In other words, Figures (6.1 and 6.5) show the difference between the model prior and post testing using the Siemens case study. Those two figures also show how the pattern of the stages of the model, derived from the testing using the Siemens case study was not matched with patterns of the stages of the conceptual model. This in return shows how the pattern matching logic was used as advocated by Yin (2003) to draw conclusions from the data analysis.

It is worthwhile to mention that the evaluation of the control variables played an important role in creating the new design recommendations for the Siemens case study. However, it was also observed that other variables could have been represented in aggregation by defining them collectively and indirectly in terms of one variable (i.e. mechanistic or organic). This was done using the mechanistic or organic variable, which is viewed as an umbrella variable. This umbrella variable can indirectly define the characteristics of other variables for each of the task activities of the office. This provides an opportunity to simplify the model by excluding any variable which can be defined indirectly through a mechanistic or organic description. For instance, formalisation and standardisation, size, centralisation vs. decentralisation, creativity as well as formal or informal are indirectly and collectively defined when a task activity is defined as mechanistic or organic. According to Robey and Sales (1994), a mechanistic structure is characterised by being formal, large in size (i.e. in terms of the number of employees), have high level of formalisation and standardisation, highly centralised and puts little emphasis on

creativity level. Whereas, an organic structure is characterised by being informal, small in size (i.e. in terms of the number of employees), highly decentralised, have high level of low formalisation and standardisation and puts big emphasis on having high level of creativity (Robey, Sales 1994).

More improvements to the model are presented below:

1. Stage 13 in Figure (6.1), which is called "Define other office characteristics or systems related to the office… etc", was deleted. Because, it was concluded that all the variables evaluated within stage 13 were either found to have little effect on the model or were already justified in other parts of the model. It is worthwhile to note that the variables, which were excluded, were not used to form views about the new design recommendations of the office. A summary of these variables and the reasons behind excluding each one of them from the model are presented in Table (6.4).

Table (6.4) illustrates a summary of the variables excluded from the model and the reasons behind excluding each one of them.

Stage	Excluded Variable from the Stage	Reason for Excluding it
1	Differentiation	The model is intended to redesign offices and an office can be considered as a small organisation (Galbraith, Downey et al. 2002). This indicates how offices can be considered as a differentiated unit. However, offices are usually small in size and not a great deal of differentiation would be required inside them, because it is usually at the lower end of the hierarchy.
	Integration	Integration is an issue of aligning office goals to the organisation's goals (McKenna 2006, Lawrence, Lorsch 1967, Huczynski, Buchanan 2007). Since the variables are related to aligning these goals of the individuals in order to reduce the effect of differentiation (Lawrence, Lorsch 1967). However, the effect of differentiation within one office is considered to be minimal.
	Hostility	The effect of hostility is considered to be an organisational concern rather than an office concern, because it is related to the characteristic of the environment (e.g. having precarious industry settings, harsh overwhelming business climates, intense competition and the relative lack of exploitable opportunities) (Kreiser, Marino 2002, Covin, Slevin 1989). . Although offices may serve markets or customers that are located outside the organisation, it is assumed that these issues of concern are handled by the executive level of the organisation which is related to the

Stage	Excluded Variable from the Stage	Reason for Excluding it
		strategy of the organisation (McKenna 2006, Bobbitt, Ford 1980).
	Pressure	It is considered that the pressure experienced by the employee is linked to creativity (Amabile, Hadley et al. 2002), which has little influence in office design. This variable is excluded from the model, unless creativity is one of the stakeholders' expectations of the office or if the office nature is organic with big emphasise on creativity.
	Size	It is defined indirectly by identifying whether the system design is mechanistic or organic as shown in stage 9 of the model in Figure (6.1). Because a mechanistic system tends to have a high number of employees whereas an organic system tends to have a low number of employees (Robey, Sales 1994).
9 & 15	Coordination	It is defined indirectly when system 2 of the Viable System Model (Beer 1985) was defined in Stages 3 & 16 for the current and future states of the office respectively as shown in Figure (6.1)
13 & 20	Formal or informal	It is defined indirectly when each task activity was defined in terms of mechanistic and organic in stage 6 of the model as shown in Figure (6.1). Because Robey and Sales (1994) state that a mechanistic system tends to be formal whereas an organic system tends to be informal.
	Centralisation Vs decentralisation	It is related to the discretion level, which was defined earlier in stage 12 of the model shown in Figure (6.1). It is also defined indirectly when each task activity was defined in terms of mechanistic and organic in stage 6 of the model as shown in Figure (6.1). Because Robey and Sales (1994) state that a mechanistic system tends to be centralised whereas an organic system tends to be decentralised.
	Creativity	This variable was dropped out from the model for two reasons: 1) It is covered within the Stakeholders' expectations variable in the Choice of Work Unit Planning office management system shown in Figure (4.3) in Chapter 4. If the Stakeholders of the office expect the office to be creative, then this variable will be considered within the design by following the guidelines of the time-pressure creativity matrix created by Amabile, Hadley et al. (2002). 2) It is also indirectly covered with the organic or mechanistic variable of this model (Robey, Sales 1994), as shown in stage 6 of the model as shown in Figure (6.1). Because an organic system tends to focus on creativity whereas a mechanistic system tends to focus on efficiency (Robey, Sales 1994).
	Formalisation and standardisation	It is defined indirectly when each task activity was defined in terms of mechanistic and organic in stage 6 of the model as shown in Figure (6.1). Because an organic system tends to have few rules, procedures and standards whereas a mechanistic system tends to have many rules, standards and procedures (Robey, Sales 1994).
	Gender mix	It is considered that the effect of bias in gender mix is minimal in the design of the office. Because hiring in organic offices is linked to having employees with high skill set such as in consulting firms, whereas hiring in mechanistic offices is linked to abilities of individuals to do the job rather than their gender (Robey, Sales 1994).
	Decision support system	It is part of the technology system type used in the office (Robey, Sales 1994), which was defined previously in stages 10 & 15 for current and future states of the office respectively as shown in

Stage	Excluded Variable from the Stage	Reason for Excluding it
		Figure (6.1)
	Trust	Since trust is defined as the expectation that a person can rely on another person's words and actions (Dirks, Ferrin 2001). It is also considered that this variable should be excluded because it may risk shifting the scope of this study into psychological issues (Dirks, Ferrin 2001). It is also assumed that trust will exist between the employees in the office as employees are regarded to be a mature workforce that is gathered for a common purpose.
	History of the office	It is considered that the history of the office in term of the employee tenure and redundancy/recruitment is linked to human resources and job satisfaction, which may risk shifting the scope of this study into psychological issues.
	Job satisfaction	Job satisfaction is related to various psychological issues such as how well the expectations of the employees are in-line with the outcomes (McKenna 2006). Therefore, it was dropped to avoid the risk of shifting the scope of this study into psychological issues (McKenna 2006). In addition, the aspects of job satisfaction that are related to employee support are already covered in the model within the supportive/relationship behaviour of the situational leadership model (Huczynski, Buchanan 2007).
	Management control system	It is defined indirectly when system 3 star of the VSM (Beer 1985) was defined in Stages 3 & 16 for the current and future states of the office respectively as shown in Figure (6.1)

2. For clarity and simplicity, variables of certain stages were grouped based on the main characteristics they aim to represent. After grouping these variables they were named alphabetically as shown in Figure (6.5). These variables are shown below: 1) The variables used to evaluate stage 1 were named variables (A). These variables were identified initially from the office current state to initiate the office redesign process, then they were re-evaluated in the future state of the office (i.e. stage 17). These variables included organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, integration, structure, task complexity, leadership style, organisational effectiveness, business strategy and constraints of office layout. 2) The variables used to evaluate stages 10 and 15 were named variables (B). These variables were related to the method used to produce the output of each task activity (i.e. current and future states). These variables included technology, interdependence and coordination. 3) The variables used to evaluate stages 12 and 19 were named variables (C). These variables were related to

identifying the characteristics of the tasks of each task activity (i.e. current and future states) in terms of weak and strong situations. These variables included reward system, discretion and skill set. A summary of all these modifications and improvements of the model are shown in Figure (6.5).

3. A development of the new generation of Value Stream Mapping was agreed by the employees, who were involved in drawing the current state maps of each of the organic task activities of the office. The employees recommended to add variables such as stakeholders' expectations and weak or strong for each of the current state value stream maps. This was done because indicating the characteristics of each of the task activities in terms of the stakeholders' expectations and whether the task activity tends to be weak or strong was considered to be a helpful indicator. This indicator was considered helpful in providing a summary of various issues of importance which can be addressed while creating the future state value stream maps. For instance, it was considered that stating the stakeholders' expectations on the current state map can enable the employees involved in creating the future state map to remember to consider these expectations while creating the future state maps.

Figure (6.5) illustrates an improved version of the methodology of implementation derived from testing the model using Siemens' case study. The modified stages are presented below in red colour.
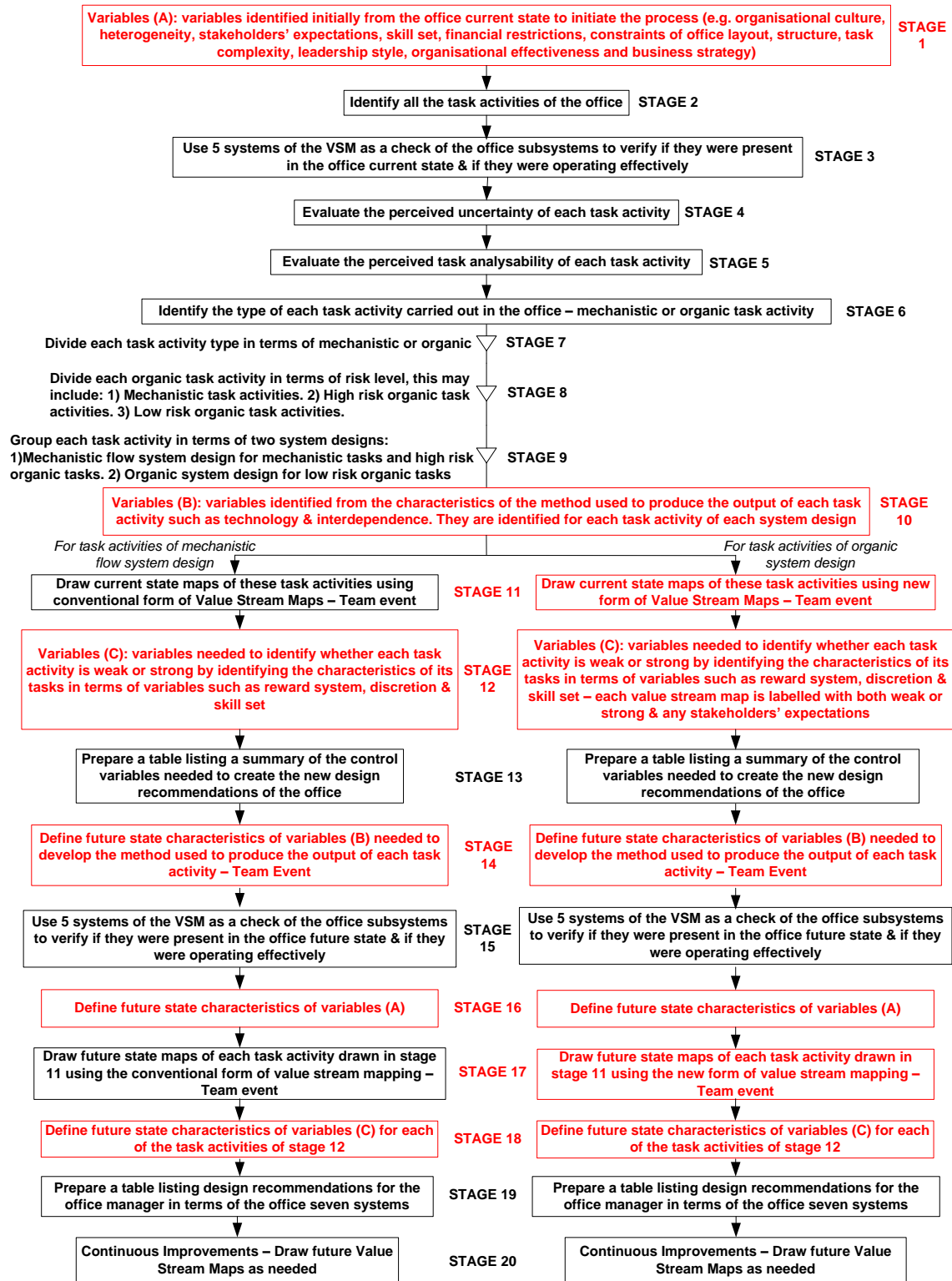
6.2.7 <u>Discussion on Siemens Case Study</u>

Action research was used as a research strategy, along with multiple case study design, to test the new generation of value stream mapping. Action research has been criticised in terms of imposing difficulties in avoiding manipulation due to the exclusion of lower level workers (Bryman 1989). This difficulty in excluding the lower level employees was not faced in this research because the lower level employees were involved in drawing the Value Stream Maps of the office. Including the lower level employees was congruent with the requirements of drawing the value stream maps of the office (Tapping, Shuker 2003, Keyte, Locher 2004).

Another criticism of action research is related to the possibility that an organisation may not implement the researcher's solution if they were perceived critical of the organisation (Bryman 1989). A cautious approach was taken to handle any potential refusal of employees in implementing results in this action research. This was done by adopting action research with distinct foci on process consultation as advocated by Schein (1999). The adoption of process consultation in this research assisted the research site employees to gain the skills and understand how to use the new generation of value stream mapping, which allowed them to develop the autonomy in improving their organisation (Schein 1999). Little evidence was found with regards to this limitation because the employees and the manager of the office were willing to fully collaborate. In order to save the time of the busy employees, the employees were advised to draw the future state maps of the office on their own. This was done for the following reasons: 1) The latter stages of the model did not depend on the results of the future state value stream maps. 2) The employees confirmed that they had good experience in drawing future state value stream maps. 3) The employees managed to draw the Value Stream Maps of the office autonomously.

The analysis of the data captured to populate the model using quasi-quantification terms encountered limitations. To make this analysis more manageable, limitations and restrictions had to be considered while summarising the quasi-quantification keywords as shown in Table (6.1). However, the use of pure qualitative research and analysis to populate the model and evaluate its various stages was faced with

various challenges and limitations. An attempt was made to reduce the effect of some of these limitations. For instance, the limitations of qualitative data such as being untidy and hard to control due to its size, information quantity as well as the resultant complexity in its analysis (Kvale 2007) were reduced. This was done by pre-planning the qualitative tasks and carrying them out based on the convenience of the respondents of the office. On the other hand, other limitations of qualitative research could not be reduced and had to be accepted. These limitations are explained below:

1) The need for good experience in qualitative research and analysis which was encountered in this study by the help and support of the researcher to the manager of the office. However, this office redesign model is to be eventually used by the manager of the office. It would be unrealistic to expect that the manager of an office to have adequate experience in qualitative research and analysis to be able to utilise this model in redesigning or diagnosing their office. Otherwise, this will require the manager to have training in qualitative research and analysis methods.

2) After carrying out the qualitative analysis for the captured data of the model, it was evident how the opinion of the analyst totally affected the way the qualitative data were analysed. This use of pure qualitative research uncovered that there was a big dependence on the perception of the manager while populating the model and evaluating each of its stages using the quasi-quantification. This was considered to be a major limitation of the qualitative research and analysis used to populate the model. This was considered because if a new manager is hired, the question of whether the new design recommendations are going to be valid or invalid will be raised. This put a case for improving the research method used to populate the model and analyse it at various stages by introducing mixed research methods (Bryman, Bell 2007), because this will allow the utilisation of quantitative data collection and analysis which are objective. This is discussed in further detail in section 6.3.2.

6.3   Rolls Royce Case Study

Initially it was intended to test the model using two carefully chosen case studies which can enable the use of replication logic (Yin 2003). The need for a second case study, which can be used to test the improved version of the model shown in Figure (6.5), was confirmed after witnessing improvements to the conceptual model as a result of testing it using the Siemens case study. This will also test the improved version of the model while considering major improvements to it in the form of an idea of using mixed methods to populate the improved version of the model and confirmed the need to carry out a second case study which aims to test the improved version of the model. The justifications behind this case study are fully explained below:

1) To strengthen the external validity of this study by using replication logic (Yin 2003). This logic aims to identify if the two similar case studies (i.e. offices exhibiting predominantly organic characteristics) can be used to support the model by producing replicated results (Yin 2003)

2) As far as the model testing phase is concerned, when the model was tested using the Siemens case study, the research method used to populate the model was pure qualitative. Although, the limitations of using a pure qualitative research method to populate the model were accepted. It was considered wise to improve the research method used to populate the model by using mixed methods research as advocated by Bryman and Bell (2007). This also instigated the need to test the improved version of the model using a second case study (i.e. Rolls Royce). This is further explained in section 6.3.2.

6.3.1   Office Background

This case was provided by Rolls Royce which is a large engine manufacturing company located in Derby, UK. The number of employees of the organisation was around 38,900. They manufactured the same engine that is used in a wide variety of different applications and industries. The company was targeting the global market of civil aerospace (i.e. air), defence aerospace (i.e. military aeroplanes), energy

applications (i.e. land) and civil or naval ships (i.e. sea). The main customers were the UK Ministry of Defence MOD, US Department of Defence DOD and various commercial airline companies.

The procurement department of Rolls Royce was divided into many different sections or bases. The office that provided this case study was called the Exostar E-Procurement section. This office was an internal consulting office, which provided IT solutions for the whole organisation. The office was more of an autonomous consulting office which was more or less decentralised and functional. The office was small and consisted of six employees. The ages of the employees ranged between (25 and 40). Various employees had various work experiences in the office. For instance, the manager of the office had a considerable experience of 15 years in Rolls Royce whereas other employees had an experience that ranged between 3-7 years. The Exostar E-Procurement manager pointed out that people were delegated to carry out various projects. However, they all interacted like a team, which according to Thompson (1967) has been described as team interdependence. The office was part of a matrix organisation. The office also operated eight hours per day of which they are entitled of a daily lunch break.

An initial interview was carried out with the manager to confirm that the office was homogeneous. This interview was guided using an interview protocol shown in Appendix (H). This was presented in Section 5.2.2 which showed how 90% of the tasks of the office were organic (i.e. this makes the office representative of an organic extreme type). The office was differentiated from the department and yet fully integrated using various IT systems.

6.3.2 Data collection Methods

As mentioned earlier, it is worthwhile to note that the conceptual model was tested using the first case study (i.e. Siemens). The research method used to populate the conceptual model were pure qualitative. The limitations of using a pure qualitative research method to populate the model were accepted when the model was being tested using the Siemens case study. However, it was believed that the research

method adopted to populate the improved version of the model shown in Figure (6.5) could be improved by using mixed methods research rather than pure qualitative research as advocated by Bryman and Bell (2007). This prompted the need to improve and develop the interview protocol used to populate the model by using mixed methods. The advantages of using mixed methods are: 1) To maximise the use of the quantitative data and minimise the dependence on the qualitative data. 2) To write the questions in a rather direct and more focused way towards the required answer (e.g. 'could you list' type questions). This was also considered to reduce the chance of the respondents talking about irrelevant issues while answering the questions. 3) To enable the quantitative analysis of the data which tends to be more objective. 4) To base the new design of the office in less subjective measures and analysis because this usually results in having more objective design recommendations to the office. This meant that the design recommendations would be more valid if a new manager is hired. As a result, every effort was made to use quantitative data collection and quantitative data analysis while populating the improved version of the model shown in Figure (6.5).

While testing the model using the Rolls Royce case study, interviews, direct observations and documents were used as the data collection methods. It is worthwhile to note that the concept of triangulation using various data sources was also utilised. This allowed corroboration of evidence from one data collection method against the evidence from another as advocated by Eisenhardt (1989). This provided this research inquiry with both stronger substantiation of constructs and hypotheses (Eisenhardt 1989) and enhanced its construct validity (Yin 2003). In addition, the introduction of mixed methods research to populate the improved version of model shown in Figure (6.5) allowed the utilisation of triangulation of mixed methods research.

6.3.2.1. Interviews

The standard procedure for carrying out interviews, which was explained within section 6.2.2.1, was used to conduct the interviews needed to test the model using the Rolls Royce case study office.

The number of interviews which were carried out in this case study was two. The aim of the interviews was to populate the improved version of the model shown in Figure (6.5). This further explained within the Rolls Royce case study data base shown in Appendix (M). It was also agreed to provide the manager with both value stream maps of the tasks of the office and a case study report. This case study report aimed to diagnose offices and introduce new design recommendations for the seven management systems of the office.

The interviews were guided by the interview protocol shown in Appendix (J). The nature of the questions used within the interview protocol determined whether each question was qualitative or quantitative (Easterby-Smith, Thorpe et al. 2002). Two types of questions were used within the interview protocol: 1) Open-ended questions, which were formulated in a way that can help the respondent to give direct answers without the need for any in-depth analysis. 2) Semantic differential scales shown in Table (6.6), because they were considered to be good indicators of a concept or construct (Corbetta 2003). An attempt was made to measure the semantic differential scale quantitatively unless the nature of semantic terms was not quantifiable (Harasym, Boersma et al. 1971). Although, five point scales are not often used in research (Al-Hindawe 1996, Strongman, Woosley 1967), they were selected in this research for the following reasons: 1) It was previously used by Strongman and Woosley (1967) due to its ability to offer a finer range of categories between the bipolar semantic adjectives. 2) The manager was considered to provide with the needed data about the office, because he had considerable experience in the office and he indicated that he knew the characteristics of the various management systems of the office. According to Saunders, Lewis et al. (2006), a researcher could select as low as a three point scale if s/he knows that the respondent can offer an accurate response. 3) A five point scale was preferred to high point scales such as a nine point scale because respondents of a nine point scale usually face difficulties in using them (e.g. challenges in finely grading evaluations making the task tedious) (Al-Hindawe 1996). 4) It was used to avoid risk experienced in a six point scale such as not knowing what the third or fourth circles on the scale means (Al-Hindawe 1996). This also avoided the risk of a respondent

getting confused whether the variable was in 'a little bit' feature or whether they were truly neutral and were pushed to choose (Al-Hindawe 1996). 5) It was considered to be more suitable than a seven point scale because the choice of a finer scale (i.e. seven or higher points) was considered to have little effect on the quality of the data to be collected. This was considered due to the fact that the data was collected from one respondent which was found to be congruent with the aim of the model (i.e. to redesign offices mainly based on the perception of the manager rather than any other employee). 6) A five point scale was considered to provide adequate information about the characteristic of the variable or construct without going into irrelevant detail that may complicate the analysis.

In addition, an attempt was made to change the position of the positive and negative adjectives from right to left to minimise the tendency of the respondent to read the adjective on the left side only as advocated by Kervin (1999).

Various variables and constructs of the model (such as task uncertainty, task complexity, task analysability and risk) were evaluated by merely identifying the type of the feature without needing much detail about the extent the feature was characterised. In other words, it was considered that identifying the feature of these various variables without much detail about the level of the feature was adequate to make judgments about the office. For instance, to evaluate the type of the task complexity, which described the tasks of various task activities of the office, the feature of the variable was defined in terms of simple or complex (i.e. it's opposite). It was considered unnecessary to know how complex or how simple the tasks were to be able to base judgments on this variable, because it was considered more important to know whether the variable was characterised in the complex part of the scale or in the simple part of the scale. This was because many of these variables and constructs were interlinked and can eventually be presented aggregately in terms of either a mechanistic or organic nature. The researcher was also able to have informal conversations with various employees of the office if clarification was needed to evaluate any variable used within the model.

All the interviews were carried out in a suitable and quiet discussion room in Rolls Royce. This was arranged by the manager of the office. The first interview was carried out with the Exostar E-Procurement manager with the aim of populating stages 1-10 of the model. This involved answering many questions about the office and organisation. This interview was carried out with the manager because this tool aimed to redesign the office based on the perception of the manager. In addition, the manager had considerable experience in the office and knew the characteristics of the office very well which was reflected by his work experience.

The second interview was a group interview. It was carried out with the manager along with other employees as part of action research used within this case study research. A team of four employees was formed by the manager based on their ability to provide the data needed to draw the value stream maps of the office. These interviews were carried out to go through stages 11 and 12 of the model. These stages were related to drawing the current state of the Value Stream Maps of the office as well as identifying characteristics of the tasks of each task activity. The value stream maps, which were drawn, are shown in Figures (6.7, 6.8, 6.9 and 6.10).

6.3.2.2. Direct Observations

The standard procedure for carrying out direct observations, which was explained within section 6.2.2.2, was used to conduct the direct observations sessions needed to test the model using the Rolls Royce case study office.

Two sessions of direct observations were carried out to gather field notes on the same days of the first and second interviews. This is further explained in the Rolls Royce case study data base shown in Appendix (M).

Various aspects of the Rolls Royce case study office were observed, these include: 1) The physical environment (e.g. the office had an open layout without any physical restrictions and it used various types of IT systems to integrate between individuals). 2) The general atmosphere (e.g. the number of employees was six, people interacted frequently and seemed to collaborate like a team, the manager spoke to

the employees regularly, the manager ensured that employees were progressing well, the interdependence between the employees tended to be based on team work, the way the employees communicated with each other was informal, and the work atmosphere tended to be pleasant but under pressure). For more details on the observed data, Table (6.6) presents the observed data from the Rolls Royce case study office that is related to various issues and/or variables of the model.

6.3.2.3. Documents

The manager provided documents in the form of catalogues to gain general understanding about the organisation, its products and its market. The manager also provided another internal report which gave more understanding about the tasks involved within the "Request for Quotes Report". An internal report was also provided by one of the employees of the office which explained how each employee had a personal plan that allowed him/her to track their targets, goals and plan any issues important to the achievement of their plans. This internal report was called the "Business Process Deployment Package".

6.3.3 <u>Data Analysis</u>

As mentioned in Chapter 5, three general strategies were used populate the improved version of the model shown in Figure (6.5) using this case study as advocated by Yin (2003) and Yin (2009). These are: 1) To depend on the conceptual model of this study in shaping the data collection plan which led to this study (Yin 2003). Consequently, the interview protocol was designed in such a way that it was guided by the various steps of the model with questions that answered each stage sequentially.2) To examine rival explanations from rival theories (Yin 2003, Yin 2000). For instance, explanations were used based on cited literature to justify the results of applying the model to the two case studies (i.e. cross-case analysis) using literal replication logic as shown in section 6.4. 3) To use both qualitative and quantitative data (Yin 2009) which resulted in changing the data collection method and analysis into mixed methods.

Open-ended questions and semantic differential scales were the type of questions used to populate the improved version of the model shown in Figure (6.5). The open-ended questions were formulated in a way that can help the respondent to give direct answers without the need for any in-depth analysis. An attempt was made to measure the semantic differential scale quantitatively unless the nature of semantic terms was not quantifiable (Harasym, Boersma et al. 1971). While analysing the scales, every effort was made to maximise the use of the quantitative aspect of the analysis (i.e. using percentages or statistical calculations). This was considered to be an added advantage for using them in this research. This advantage was related to the fact that their analysis can become more objective if used quantitatively. For instance, quantitative averages were only calculated to analyse a group of semantic differential scales which aimed to evaluate variables consisting of various components (e.g. task uncertainty). However, this was not done during the evaluation of the other variables measured using one scale because one respondent was used to answer the scale. On the other hand, if the variable evaluated using the semantic differential scale was not quantifiable (i.e. has a qualitative nature), it was analysed qualitatively. This qualitative analysis was carried out using two analytical conditions customised based on the answer of the variable the scale is attempting to evaluate. While developing these two conditions needed to analyse each pure qualitative scale, every effort was made to maximise the use of cited literature in order to reduce the subjectivity in their qualitative analysis. An example of this is shown in the interview protocol of the Rolls Royce case study in Appendix (J).

It is worthwhile to note that the analysis of the answers of the respondents to each scale followed a structured methodology. This methodology is shown in Figure (6.6). The answer of each scale shown in Figure (6.6) was analysed by the researcher using a system of numerical representations. This system is shown below:

- The numerical numbers (-2 or 2) were given to the extreme points of each side of the scale. If the answer of the respondent was any of these points on the scale, a meaning of "an extreme" semantic description was given to each side of the scale.

- The numerical numbers (-1 or 1) were given to the points located between the middle point and the extreme point of each side of the scale. If the answer of the respondent was any of these points in the scale, a meaning of "somewhere between" semantic description was given to each side of the scale.

- The numerical number (0) was given to the middle point of the scale. It means that the respondent was "not sure" as advocated by Saunders, Lewis et al. (2006).

Figure (6.6) illustrates the analysis methodology used for the semantic differential scale.
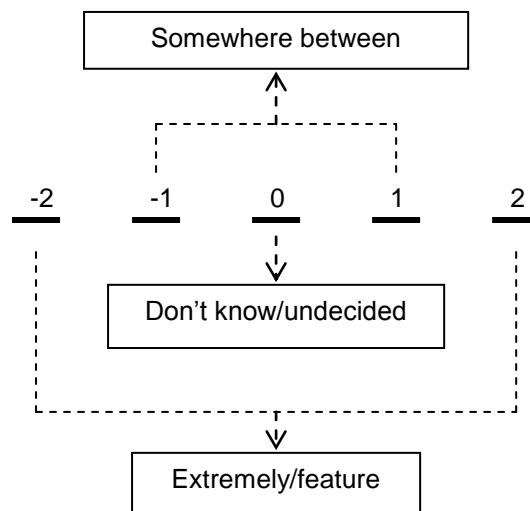
As a result, a numerical value was used to represent the answer of the respondent while evaluating each variable. If the variable was evaluated using more than one scale, then the average of the numerical answers of each scale were used to represent the variable. Each one of these numerical values was then further translated using three rules. These rules are shown below:

- If the numerical value representing the answer of the variable was positive, then it meant a particular semantic description.

- If the numerical value representing the answer of the variable was negative, then it meant an opposite semantic description.

- A numerical value of zero was analysed for each of the variables using the researcher's discretion. However, this was based on the following two dimensions: 1) The cited literature which was related to the context and nature of the office. 2) The use of triangulation of different sources of data by corroborating the evidence from observations and documents against each other.

Table (6.5) illustrates a sample of the quantitative analysis that was carried out for the semantic differential scales to evaluate the level of task operation uncertainty for three task activities of the Rolls Royce case study. It shows how this variable was evaluated using statistical average calculations within stage 4 of the model shown in Figure (6.5).

Table (6.5) illustrates how quantitative analysis was used while calculating the average of the answers of each component of task operations uncertainty.

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="3">Task activities of the office</td></tr>
<tr><td>e-sourcing</td><td>e-collaboration</td><td>e-scheduling</td></tr>
<tr><td rowspan="6">Components of task operation uncertainty</td><td>Due to lack of knowledge in tasks</td><td>75% (+1)</td><td>75% (+1)</td><td>75% (+1)</td></tr>
<tr><td>Due to lack of knowledge in time</td><td>75% (+1)</td><td>75% (+1)</td><td></td></tr>
<tr><td>Due to absenteeism</td><td>25% (-1)</td><td>25% (-1)</td><td>25% (-1)</td></tr>
<tr><td>Due to lack of skill set</td><td></td><td></td><td></td></tr>
<tr><td>Due to important technology breakdown</td><td></td><td></td><td></td></tr>
<tr><td>Due to waste of waiting</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Average overall task operation uncertainty level</td><td>58.3% (+0.33)</td><td>58.3% (+0.33)</td><td>50% (0)</td></tr>
</table>

The result of the statistical analysis summarised in Table (6.5) shows how the level of task operation uncertainty for the e-sourcing is positive (i.e. +0.33). This meant that the task operation uncertainty for this task activity tended to be unpredictable.
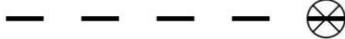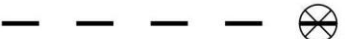
6.3.4 Applying Rolls Royce Case Study to the Model – Results and Data Analysis

The testing of the improved version of the model shown in Figure (6.5) was also conducted using this Rolls Royce case study. It was carried out by following the various steps of the model as shown in Table (6.6).
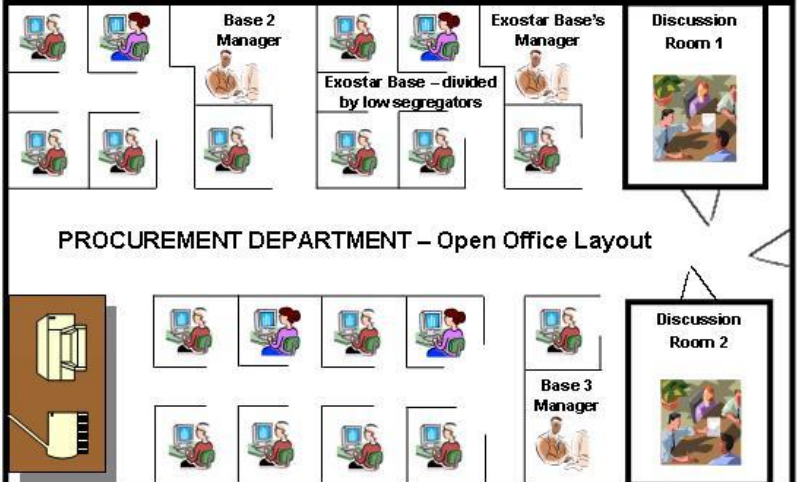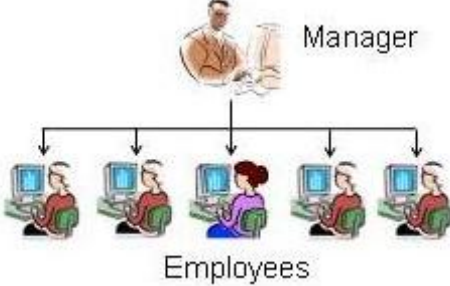
Table (6.6) shows evidence and analysis of the gathered triangulated data needed to populate the improved version of the model using the Rolls Royce case study.

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
Stage 1	Heterogeneity	The office products tended to be heterogeneous as evident from the internal documents, the field notes of observations of the office and the interview with the manager. **MANAGER'S ANSWER:** The manager suggests that the products and markets of the office are heterogeneous (Miller, Friesen 1984), because he marked the scale as: Our office serves a limited number of different markets. ⊗ Our office serves a wide variety of highly diverse markets.
		TRIANGULATION USING OBSERVATIONS: It was observed that the office is an internal consulting office which provides various parts of the organisation with various IT solutions.
Stage 1	Leadership style	The situational leadership style used in the office is participating as stated by the manager of the office, which also does not seem to conflict with the observations. **MANAGER'S ANSWER:** *"Basically, in this office we have mainly R4 followers"* *"I think it is more like S3 - participating style, because I give them support in terms of relationship behaviour and the sponsor (i.e. mentor) gives us the task behaviour"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the manager is available in a very informal way and frequently interacts with the employees face to face or in group meetings held in discussion rooms located in the office but segregated using cubicles. In addition, the manager actively approaches the employees to ensure that they were progressing well and they do not need any support. In addition, the manager is located right between the employees, were he can directly observe them.
Stage 1	Stakeholders' expectations	**MANAGER'S ANSWER:** The manager states that the Stakeholders' Expectation imposed by the executives and customers of this office are: *"…main customers (MOD and DOD), who want us to make sure that the output is definitely quality, version controlled (i.e. the right version). Also, they want the data people are sending or receiving... whoever they are sending to either internally or externally to be highly secured… Senior directors want us to do the job accurately and quickly… the people who are involved in the e-scheduling, e-collaboration and e-sourcing also need to be creative in finding new solutions, unlike the e-catalogue"*
Stage 1	Organisational effectiveness & business strategy	**MANAGER'S ANSWER:** The manager states that the purpose of the office is: *"To automate supply chain and collaboration processes through the use of internet based toolsets in order to reduce the costs of goods and services, improved operational efficiency, enabling greater Service improvement whilst ensuring compliance, at the same time upskilling the supply chain population to work smarter."* The manager also states that the business strategy is:

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		"Like I said if you plan it and do a proper business plan deployment, you know like August and September of this year, we went out to our customers and said what do you want for next year, and they tell us the key drivers and activities they want required for next year, and then we build our plans around that… A customer might come approach and say, we need some help in... We have to go there to find a system then work with them to develop the system... So, let the customer to define the how to, we will make it electronically happen but the customer will define it"
Stage 1	Characteristics of the organisational culture of the current state of the office – Competing Values Framework	Both interviews and observations suggest that the culture of the office is clan. **MANAGER'S ANSWER:** The manager described the office in terms of the Competing Values Framework to be: *"… clan".* He also pointed out that the culture of the office is flexible (Cameron, Quinn 1999, Cameron 2009), because he marked the following scale as follows: This office is unpredictable to the point where it requires flexibility & discretion to handle it. ⊗ — — — — This office is predictable to the point where it can be handled by having rigid controls, rules & orders. In addition, the manager states that the culture of the office is internally focused (Cameron, Quinn 1999, Cameron 2009), because he marked the following scale as: The focus in this office is on achieving unity and collaboration between people to accomplish the output of the office ⊗ — — — — The focus in this office is on achieving a competitive advantage through the availability of the right provisions. **TRIANGULATION USING OBSERVATIONS:** It was observed that the office serves other internal parts of the organisation, a sense of collaboration and team work between the e-sourcing, e-collaboration and e-scheduling was also drawn.
Stage 1	Characteristics of the organisational culture of the current state of the office – Weakly / strongly shared values	**MANAGER'S ANSWER:** The manager confirmed the culture of the office is strong. He listed the values of the office as: *"Quality, version controlled (It's got to be the right version), accurate, commitment and involvement of the customer and highly secured"* He also pointed out that the culture of the office is strong (McKenna 2006, Gordon, Di Tomaso 1992) and more similar to mechanistic structures (Schein 1985), because he marked the following scale as: There is no identifiable culture in the office. — — — — ⊗ There is one set of cultural values & beliefs in the office held by all members The manager pointed out that the culture of the office tends to be weak as it is proven to be more adaptable to external or environmental changes and similar to organic systems (Robey, Sales 1994, Schein 1985), because he marked the following scale as: There is no resistance to change due to the beliefs and values of the people working in the office ⊗ — — — — There is resistance to change due to the beliefs and values of the people working in the office **TRIANGULATION USING OBSERVATIONS:** It was observed that the employees shared values such as focus and collaboration.
Stage 1	Task complexity	Both interviews and observations confirmed that the tasks of the office tend to be complex. **MANAGER'S ANSWER:** The manager listed that the following task activities would be perceived as complex for a new employee: *"e-sourcing, e-collaboration & e-scheduling"* The manager suggested that the e-sourcing task activity is complex,
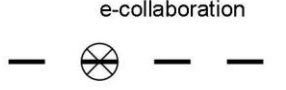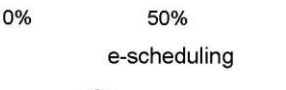
Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		because he marked the scale as: *e-sourcing* The tasks of this task activity assume a small diversity of states or modes of behaviour — — — — ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour The manager suggested that the e-collaboration task activity is complex, because he marked the scale as: *e-collaboration* The tasks of this task activity assume a small diversity of states or modes of behaviour — — — — ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour The manager suggested that the e-scheduling task activity is complex, because he marked the scale as: *e-scheduling* The tasks of this task activity assume a small diversity of states or modes of behaviour — — — — ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour
		TRIANGULATION USING OBSERVATIONS: It was observed during drawing the current state value stream maps in stage 11 that the tasks of the e-sourcing, e-collaboration and e-scheduling tend to be complex as black boxes were used to represent the complex ones.
Stage 1	Task complexity – Variety	Both interviews and observations confirmed that the e-sourcing, e-collaboration and e-scheduling task activities of the office tend to be of high variety. **MANAGER'S ANSWER:** *"I think it would be in the tasks related to providing the training of the e-sourcing… also… e-collaboration and e-scheduling"* He also marked the scale as: *e-sourcing* The variety level of the tasks in this task activity is limited — — — — ⊗ The variety level of the tasks in this task activity is wide It is also concluded from the manager that the e-collaboration task activity has high task variety, because he marked the scale as: *e-collaboration* The variety level of the tasks in this task activity is limited — — — — ⊗ The variety level of the tasks in this task activity is wide It is concluded from the manager that the e-scheduling task activity has high task variety, because he marked the scale as: *e-scheduling* The variety level of the tasks in this task activity is limited — — — — ⊗ The variety level of the tasks in this task activity is wide
		TRIANGULATION USING OBSERVATIONS: When the current state value stream maps were being drawn in stage 11, the tasks of the e-sourcing, e-collaboration and e-scheduling were described, while having an informal conversation with one of the employees, as tasks with high level of variety
Stage 1	Skill set	**MANAGER'S ANSWER:** The manager pointed out that the following task activities require complex skill set to be performed: *"e-sourcing, e-collaboration, e-scheduling… I think that these require higher skills than in the e-catalogue… e-catalogue is for secretaries…"* The e-sourcing task activity tends to be complex due to the high level of
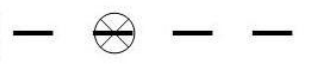
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Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988). Because the manager marked the scale below as: **e-sourcing** The skill set required to carry out the tasks of this task activity is simple. — — — — ⊗ The skill set required to carry out the tasks of this task activity is complex. The e-collaboration task activity tends to be complex due to the high level of required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988). Because the manager marked the scale below as: **e-collaboration** The skill set required to carry out the tasks of this task activity is simple. — — — ⊗ — The skill set required to carry out the tasks of this task activity is complex. The e-scheduling task activity tends to be complex due to the high level of required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988). Because the manager marked the scale below as: **e-scheduling** The skill set required to carry out the tasks of this task activity is simple. — — — ⊗ — The skill set required to carry out the tasks of this task activity is complex. The e-catalogue task activity tends to be simple due to the low level of required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988). Because, the manager marked the scale below as: **e-catalogue** The skill set required to carry out the tasks of this task activity is simple ⊗ — — — — The skill set required to carry out the tasks of this task activity is complex
Stage 1	Financial restrictions	**MANAGER'S ANSWER:** The manager described the financial restrictions on the projects of the office as high, because he marked the scale below as: There are relatively many financial restrictions on the budgets of this office. — ⊗ — — — The budget of the office is open with relatively no restrictions.
Stage 1	Constraints of office layout	**MANAGER'S ANSWER:** *"No constraints, I do not think so!"* **TRIANGULATION USING OBSERVATIONS:** The observed office layout was drawn as shown below:

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Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		 PROCUREMENT DEPARTMENT – Open Office Layout
Stage 1	Structure	Both interviews and observations confirm that the structure of the office is flat. **MANAGER'S ANSWER:** *"There is only me in the office and five other employees"* **TRIANGULATION USING OBSERVATIONS:** It was observed that the office had one manager, which made the structure look like this:
Stage 2	Identify the task activities of the office	**MANAGER'S ANSWER:** *"The e-scheduling tasks are the runners, because they are about 40%... The e-sourcing tasks are the repeaters because they are about 30%...I would say the e-collaboration tasks are the repeaters, because they are around 20%... whereas the e-catalogue tasks are the strangers because they are about 8%... you've also got other random tasks which are about 2%."*
Stage 3	Viable System Model – office current state	All systems of the VSM were identified without any task activities that are liable to the system or provide no value. **MANAGER'S ANSWER:** The manager also pointed out that there are no task activities that add no value to the office. The existence of all VSM systems was confirmed in the manager's interview. At the same time, field notes of direct observations confirmed systems one, two and three star were used in the office. It has been detected from observing the value stream maps that system one consists of four task activities, for more details see value stream maps of the office shown in Figures (6.7, 6.8, 6.9 and 6.10). **MANAGER'S ANSWER:** *"You have got different people who are leading these teams of work"* System 2 exists in the office current state in various forms; these include the method used for task allocation and the coordination modes used in the office. **MANAGER'S ANSWER:** *"There is a plan, which coordinates the jobs and activities for people in the*

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Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		office. This plan is done by them and me and reviewed once in a while. It is also judged by the senior directors of the organisation to make sure that we usually prioritise the jobs and do the ones which are most important" In addition the manager described the coordination modes used in the office as *"In general we use planning, goal selection, task decomposition, managerial decision, priority order, unscheduled team meetings, standardisation and standardisation of norms… you know…* *In more details, for the e-sourcing, e-collaboration & e-scheduling, we use schedules, mutual adjustments and interdepartmental teams, however for e-catalogue, we use rules and schedules…"* *"To coordinate the shared tasks we use managerial decisions and schedules"* System 3 exists in the office as a planning system called the business plan deployment pack. **MANAGER'S ANSWER:** *"There is a plan called Business Plan Deployment Pack Contents for each of the employees… I will give it to each one of them to keep it and look at it. It consists of various parts… It coordinates the jobs and activities of the people of the office. This plan is done by them and me and reviewed once in while… It is also judged by the senior directors of the organisation. Controlling the employees will also come probably from me in terms of how I am gonna make that happen for them "* System 3* also exists in the office. **MANAGER'S ANSWER:** • *"Behaviour we do once a month, output we do once a month but separate"…* • *"… We monitor both every month. Behaviour I have a one to one every month with each individual. So I monitor how they are doing with their behaviour then we look at output as well…"* • *"… We also get customer feedback like surveys, which is from the shop floor… based on the employee's output…"* • He also summarised, *"Behaviour we do once a month, output we do once a month but separately… And then a senior director comes for the outputs, so in front of him, you are seeing how you are doing monthly against his plan."* • He also states, *"… once a business plan deployment is done, by finding out what the customer wants in August and September for its following year, we assess and evaluate the skills needed for each of the individuals according to his plan, then they have their objectives for what they want to do next year and they have a training plan linked to those objectives."* • *"There were targets set to the people operating that process, then they had to do so many per month… then when that person (the individual) at the end of the year say 'yah I did this… that… that… this' then the manager can look at the data we sent them and say 'actually its incorrect… you've been working outside the process and outside the tool using manual, because the data is telling me this'… the tool gives us data… and we'll take that data and send it the managers and they can decide how they want to do it… This is done monthly…* In addition, the manager indicated that behaviour management control is used in the office. **MANAGER'S ANSWER:** 0% 50% 100% None of the employees' behaviour is directly observed. ___ ___ ___ ___ ⊗ All of the employees' behaviour is directly observed. System 4 exists in the office current state.

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		MANAGER'S ANSWER: The manager described the information received in the office that may change, modify or improve the way the activities and tasks of the office are done as: *"This will come from the mentor (or the sponsor) on how they want those processes done and which one.* *This information can also be received to any member of the team including myself it could be about new software I would say... or generally new technology that may come out which anyone in the office might inform me about... you know what I am saying... also... customer feedback is very important and gets sent to me..."* System 5 exists in the office in the form of policy or purpose that is set by the executives of the organisation. **MANAGER'S ANSWER:** *"... It is coming from Plc board level in terms of what improvements they need, so if you look at all those improvements we are bringing in, it is saving money and standardising processes… so that's coming from their policy."*
		TRIANGULATION USING OBSERVATIONS: It was observed that the office had system one throughout its activities and operations carried out by each employee. In addition, it was observed that schedules were used in the office to coordinate certain shared tasks.
		TRIANGULATION USING DOCUMENTS: System 3 of the office was described using an internal report that was provided by one of the employees of the office which explained how each employee has a personal plan which allows them to track their targets, goals and plan any issues needed to achieve their plans. This internal report is called the Business Process Deployment Package.
Stage 4	Task uncertainty components	The input environmental uncertainty of the office tends to be unpredictable for each of the task activities (McKenna 2006, Robey, Sales 1994, Dill 1958) as evident below: **MANAGER'S ANSWER:** *"All the task activities are influenced by security standards imposed by MOD and DOD"* The manager also described the level of input environmental uncertainty by marking the scale as shown below: Both interviews and observations provide evidence related to the unpredictability in task operation uncertainty which exists in most task activities of the office. This is explained below: **MANAGER'S ANSWER:** The manager described the task operation uncertainty of the following task activities to be unpredictable: *"e-sourcing, e-collaboration & e-scheduling do not have fixed process, because they are done by applying different dimensions to them, which relies on humans"* He also marked the following scales as shown below:

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage

0%   50%   100%

e-collaboration

There is a lack of patterning in the process and knowledge used to finish the tasks of this task activity — ⊗ — — — There is a distinctive pattern in the process and knowledge used to finish the tasks of this task activity

0%   50%   100%

e-scheduling

There is a lack of patterning in the process and knowledge used to finish the tasks of this task activity — ⊗ — — — There is a distinctive pattern in the process and knowledge used to finish the tasks of this task activity

0%   50%   100%

e-sourcing

There is a lack of knowledge about the time needed to complete the tasks of this task activity — ⊗ — — — There is a sufficient knowledge about the time needed to complete the tasks of this task activity

0%   50%   100%

e-collaboration

There is a lack of knowledge about the time needed to complete the tasks of this task activity — ⊗ — — — There is a sufficient knowledge about the time needed to complete the tasks of this task activity

The manager described the task operation uncertainty due to absenteeism to be predictable for most task activities of the office as shown below:

MANAGER'S ANSWER:

The manager states that the following task activities of the office are influenced by absenteeism of critical employee who provides input / work necessary for its completion:

"e-sourcing, e-collaboration & e-scheduling"

He also marked the following scales as shown below:

0%   50%   100%

e-sourcing

All the tasks can be carried out in this task activity, when a critical employee is absent. — ⊗ — — — All tasks of this task activity cannot be carried out, when a critical employee is absent.

0%   50%   100%

e-collaboration

All the tasks can be carried out in this task activity, when a critical employee is absent. — ⊗ — — — All tasks of this task activity cannot be carried out, when a critical employee is absent.

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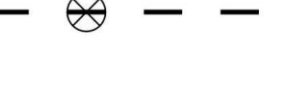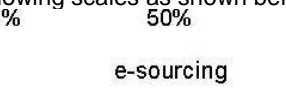| Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		0% 50% 100% **e-scheduling** All the tasks can be carried out in this task activity, when a critical employee is absent. ⊗ All tasks of this task activity cannot be carried out, when a critical employee is absent. The output environmental uncertainty due to the level of dynamism for the e-sourcing, e-collaboration and e-scheduling task activities was concluded to be unpredictable. In addition, output environmental uncertainty due to frequency of customer demand for the e-collaboration was unpredictable. **MANAGER'S ANSWER:** The manager described the following tasks to have volatile customer specifications: *"e-sourcing, e-collaboration and e-scheduling"* He also marked the following scales as shown below: 0% 50% 100% **e-sourcing** The customer needs (products or services) specifications of this task activity are stable ⊗ The customer needs (products or services) specifications of this task activity are volatile and fluctuating 0% 50% 100% **e-collaboration** The customer needs (products or services) specifications of this task activity are stable ⊗ The customer needs (products or services) specifications of this task activity are volatile and fluctuating 0% 50% 100% **e-scheduling** The customer needs (products or services) specifications of this task activity are stable ⊗ The customer needs (products or services) specifications of this task activity are volatile and fluctuating 0% 50% 100% **e-collaboration** The frequency of customer demand for this task activity is predictable. ⊗ The frequency of customer demand for this task activity is unpredictable.
		TRIANGULATION USING OBSERVATIONS: It was observed during drawing the current state value stream maps in stage 11 that the tasks of the e-sourcing, e-scheduling and e-collaboration tend to be predominantly unpredictable, however, the tasks of the e-catalogue task activity tend to be predominantly predictable.
Stage 5	Task analysability	Both interviews and observations confirmed that tasks of the e-sourcing, e-collaboration and e-scheduling are unanalysable. **MANAGER'S ANSWER:** The manager described the following task activities of the office to involve unexpected problems which require human judgments or intuition of employees to be solved (i.e. they cannot be standardised): *"e-sourcing, e-collaboration & e-scheduling"* The manager also marked the following scales as shown below:

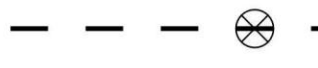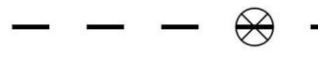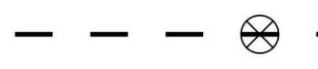| Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		0% 50% 100% **e-sourcing** The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments 0% 50% 100% **e-collaboration** The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments 0% 50% 100% **e-scheduling** The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments
		TRIANGULATION USING OBSERVATIONS: It was observed during drawing the current state value stream maps in stage 11 that the tasks of the e-sourcing, e-collaboration and e-scheduling tend to be unanalysable as difficulties arose while attempting to break them down into smaller tasks.
Stage 6	Identify task activity type – Mechanistic or organic	**MANAGER'S ANSWER:** The manager identified the type of each task activity in terms of mechanistic and organic, as shown below: The e-sourcing, e-collaboration and e-scheduling are organic task activities and the e-catalogue is a mechanistic task activity
Stage 7	Divide the task activities of the office in terms of mechanistic & organic	**MANAGER'S ANSWER:** the manager pointed out that office consisted of three organic task activities and one mechanistic one.
Stage 8	Divide the organic task activities in terms of risk	All task activities of the office are with low risk, which means that three task activities of the office are organic with low risk and one is mechanistic with low risk. **MANAGER'S ANSWER:** The manager states there are not any high risk tasks that could cause a threat to the lives of others or to the viability of the organisation.
Stage 9	Group task activities in terms of the two system designs	**MANAGER'S ANSWER:** There are low risk organic task activities (e.g. e-sourcing, e-collaboration and e-scheduling), which will be designed using an organic system design. In addition, there is a low risk mechanistic task activity (e.g. e-catalogue), which will be designed using a mechanistic flow system design.
Stage 10	Define characteristics of variables (B) for office current state - interdependence & technology	**MANAGER'S ANSWER:** The manager pointed out that e-sourcing, e-collaboration & e-scheduling have team interdependence with intensive technology. The coordination modes used are standardisation, rules, schedules, mutual adjustments, shared resources, task assignments, producer/consumer relationship and task goal selection. In addition, he pointed out that e-catalogue has sequential interdependence with long-linked technology. The coordination modes are standardisation, rules, schedules & shared resources.

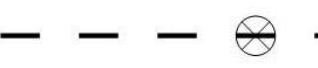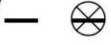| Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
		MANAGER'S ANSWER: The manager described the interdependence of the task activities of the office as shown below: *"I would say… e-sourcing, e-collaboration & e-scheduling are team, however e-catalogue is sequential"* The manager described the technology systems used in the office current state as: *"e-sourcing tool, e-scheduling tool, e-collaboration tool, e-catalogue tool… SAP system, lots of I.T. software… etc"* Various Malone, Crowston et al.'s (1999) Dependencies are used in the office. **MANAGER'S ANSWER:** The manager pointed out that the following resources are shared in the office: *"I would say money and employee time are shared in all task activities of the office"* • In addition, the manager pointed out that flow prerequisite dependency exists in the following task activities: *"e-sourcing, e-collaboration, e-scheduling and e-catalogue"* • Moreover, the manager pointed out that flow accessibility dependency exists in the following task activities: *"e-sourcing, e-collaboration, e-scheduling and e-catalogue"* • Furthermore, the manager pointed out that flow usability dependency exists in the following task activities: *"e-sourcing, e-collaboration, e-scheduling and e-catalogue"* • In addition, the manager pointed out that simultaneity constraints dependency exists in the office as explained below: *"… We have five employees in this office… Each one have shared and individual tasks. Those tasks are drawn for each one of them in a Business Plan Deployment Pack Contents… This plan can also be seen as the schedule of the office."* • Moreover, the manager pointed out that fit dependency exists in the following task activities of the office: *"e-sourcing, e-collaboration, e-scheduling and e-catalogue"*
		TRIANGULATION USING OBSERVATIONS: It was observed that the employees of the e-collaboration, e-scheduling and e-sourcing communicated intensively with each other, which indicated that team work and collaboration is highly adopted between the employees, whereas the e-catalogue employees did not talk to others much.
Stage 11	Draw Value Stream Map of each task activity of the office – current state	**ANSWER OF A TEAM CONSISTING OF THE MANAGER AND THREE OTHER EMPLOYEES:** See Figures (6.7, 6.8, 6.9 and 6.10). The mechanistic flow system design task activity (i.e. e-catalogue) was drawn using the conventional form of value stream mapping. In addition, the organic with low risk task activities (i.e. e-sourcing, e-collaboration & e-scheduling) were drawn using the new form of value stream mapping
		TRIANGULATION USING DOCUMENTS: The value stream map of the e-sourcing task activity (i.e. Request For Quotations) was confirmed using an internal report, which provides more understanding about the tasks involved within the request for quotation process.
		TRIANGULATION USING OBSERVATIONS: Various observations were made about various tasks of the office while having informal conversations with the employees who were involved in the team activities for drawing the Value Stream Maps of the current state of the office.

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
Stage 12	Define characteristics of variables (C) for office current state	**MANAGER'S ANSWER:** The manager pointed out earlier that the e-sourcing, e-collaboration and e-scheduling require high skill set, which is still found to be suitable with the organic nature of the task activities. In addition he pointed out that the e-catalogue requires low skill set too as it is more of a secretarial job, which is found to be suitable with the mechanistic nature of the task activity. • The manager was asked to list the task activities that require high discretion to be performed, he states: *"e-sourcing, e-collaboration, e-scheduling"* • The manager suggests that a subjective reward system is used for employees of e-sourcing, e-scheduling and e-collaboration and objective reward system is used for e-catalogue, he states: *"All of the task activities have an objective numerical reward system, but you have to take into consideration that the e-sourcing, e-collaboration and e-scheduling can be unpredictable and complex, I will give an example… a target will be set that 30% of all supplier bids that go out from Rolls Royce to be automated rather than manual using the e-sourcing tool. That is the target, but the target say for example to the e-catalogue will be more because it is less variable than this one. You cannot do 100%... there is no way it's gonna work. So when the objectives are closed out, it depends on what performance factor you get, which is related to your bonus… based on that there is monetary and promotional rewards. They have to hit the target, you set your target at the beginning of the year and your manager will with you, if you do not achieve them, you know what's gonna happen… if you achieve them, its good platform for you to get more money, reward or go to your next level up…* *Yearly main assessment for measuring the output and the behaviour of the employees in all task activities, the employees will be appraised or rewarded based on achieving their target"* It is concluded from the results of this stage that the e-sourcing, e-scheduling and e-collaboration tend to be weak, because skill set is high, discretion is high and reward system is subjective (Mischel 1977). On the other hand, it is concluded from the results of this stage that the e-catalogue tend to be strong because skill set is low, discretion is low and reward system is objective (Mischel 1977).
		TRIANGULATION USING OBSERVATIONS: It is observed from the value stream maps that the e-sourcing, e-collaboration and e-scheduling tend to be organic and therefore, require high skill set, high discretion and it would be difficult to obtain an objective reward system for them (Robey, Sales 1994). However, it is also observed from the e-catalogue value stream map that it tends to be mechanistic and therefore, require low skill set, low discretion and it would be possible to obtain an objective reward system for it (Robey, Sales 1994).
Stage 13	List of control variables	A list of the control variables of the office was gathered from the early current state stages of the model. This list is shown below:

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage		
		Task activity	**Variable**	**Level**
		e-sourcing	Task Complexity	High
			Task Uncertainty – input	High
			Task Uncertainty – operations	High
			Task Uncertainty - output	High
			Task Analysability	Low
			Risk	Low
			Mechanistic Vs Organic	Organic
		e-collaboration	Task Complexity	High
			Task Uncertainty – input	High
			Task Uncertainty – operations	High
			Task Uncertainty – output	High
			Task Analysability	Low
			Risk	Low
			Mechanistic Vs Organic	Organic
		e-scheduling	Task Complexity	High
			Task Uncertainty – input	High
			Task Uncertainty – operations	High
			Task Uncertainty - output	High
			Task Analysability	Low
			Risk	Low
			Mechanistic Vs Organic	Organic
		e-catalogue	Task Complexity	Low
			Task Uncertainty – input	High
			Task Uncertainty – operations	Low
			Task Uncertainty - output	Low
			Task Analysability	High
			Risk	Low
			Mechanistic Vs Organic	Mechanistic
Stage 14	Define characteristics of variables (B) (i.e. inter-dependence & technology) of the office current state	The interdependence recommended for the future state of each task activity of the office was determined from the characteristic of the mechanistic or organic control variable. For instance, the e-sourcing, e-collaboration and e-scheduling are organic, therefore a reciprocal or team interdependence would be most suitable (Robey, Sales 1994). However, of the high emphasis on team work and collaboration, it is recommended to keep the interdependence as team.

The technology type recommended for the future state of each task activity was identified based on the type of interdependence used. Intensive technology is suitable for the future state of the e-sourcing, e-collaboration and e-scheduling task activities, because the interdependence type is team (Robey, Sales 1994). In addition, the technology type that is suitable for the future state of the e-catalogue task activity is long-linked, because the interdependence is sequential (Robey, Sales 1994). | | |
| | | **TRIANGULATION USING OBSERVATIONS:** It was observed that nature of the office is an internal consulting office. The employees of the e-sourcing, e-scheduling and e-collaboration communicated frequently with each in more collaborative manner, unlike the e-catalogue employees who did not really talk to others. | | |

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
Stage 15	Viable System Model - Office future state	It was found that all five systems of the VSM exist in the office. In addition, there were no task activities or systems that were regarded as waste in the office. It is recommended to make new design recommendations for the coordination modes of system 2 and the management control systems of system 3* of the office. The coordination modes used in system 2 that are recommended to be used in the office future state were selected based on the types of Malone, Crowston et al.'s (1999) dependencies and Thompson's (1967) interdependences (Robey, Sales 1994) used in the office. These are: • For the e-sourcing, e-collaboration, e-scheduling: Face to face discussions, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and/or teamwork, because they have team interdependence. For the e-catalogue: Committees, planning, scheduled meetings, standardisation, rules and/or schedules, because it is sequentially interdependent. • "First come/first serve", priority order, budgets and/or managerial decisions, because sharing dependency exists. • Notification, because flow prerequisite dependency exists. • Standardisation and/or participatory design to ask individual users, because usability dependency exists. • Goal selection and/or task decomposition, because fit dependency exists. The recommendation of the management control systems of system 3* are based on whether the office consists of organic or mechanistic value stream maps. The recommended systems to monitor the organic e-sourcing, e-collaboration and e-scheduling value stream maps are explained below: • Keep output controls – Prospect controls by having monthly meetings with the manager. • Keep output controls – Prospect controls by having monthly team meeting with a senior director. • Keep output controls – Customer feedback (e.g. surveys). • Keep personal controls in the form of a training plan done by them and the manager by linking the plan to their objectives. • To have sophisticated integrative mechanisms in the form of team meetings to increase the office's response, flexibility & adaptation. • To have performance appraisals that offer broad scope information, flexible aggregations & interactive information as well as information given in a timely way. However, it is recommended to use any of the following management control systems to monitor the mechanistic e-catalogue value stream map: • Operating procedures budgets and statistical reports. • Output and result controls. • Behaviour controls including standardisation, formalisation and rules. Diagnostic controls by using control to offer feedback on operations.
Stage 16	Characteristics of the organisational culture of the office future state – Competing	The characteristics of the office current state in terms of the Competing Values Framework, mainly two dimensions were also identified in the previous stages of the model as internal and flexible. These are recommended to remain the same in the future state of the office. Therefore, referring to the figure shown below, which illustrates the four quadrants of the Competing Values Framework, the suitable culture for the office future state is clan.

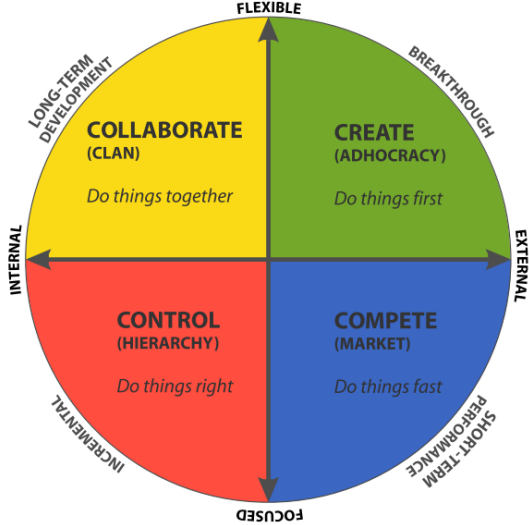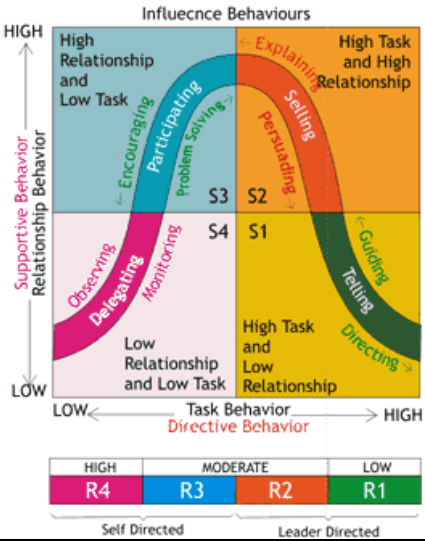| Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
	Values Framework	
		TRIANGULATION USING OBSERVATIONS: It was observed that the office serves other internal parts of the organisation, a sense of collaboration and team work between the e-sourcing, e-collaboration and e-scheduling was also drawn.
Stage 16	Characteristics of the organisational culture of the office future state – Weak/strong shared values	The shared values used in the current state of the office are recommended for the future state of the office too. Furthermore, the recommended culture strength for the office future state is weak because the office consists of predominantly organic task activities with low resistance to change.
		TRIANGULATION USING OBSERVATIONS: The office consists of predominantly three organic task activities and only one mechanistic. Also a weak culture is similar to organic systems because it is more adaptable to external or environmental changes (Robey, Sales 1994, Schein 1985)
Stage 16	Leadership style of office future state	Based on referring the type of followers that exist in the office to the situation leadership model shown below. The manager states that follower types of the office are all R4. Consequently, the leadership style recommended to the future state of the office is S4 delegating leadership style.
		TRIANGULATION USING OBSERVATIONS: The employees were observed to be confident and focused on their tasks. The energy of the employees was vibrant as they were excited to get the work done
Stage	Stakeholders'	All the expectations discussed in the current state are also recommended in

Stage	Variable related	Manager's Answer / Direct Observations for each of the variables of each stage
16	expectations	the future state. The manager states that the employees need to be creative in finding new solutions in the e-sourcing, e-scheduling and e-collaboration. According to Creativity pressure/time matrix (Amabile, Hadley et al. 2002), it is recommended that the employees feel that they are in a mission and that there is value for their work because the pressure on them is high.
Stage 17	Draw future state value stream maps of each task activity	This stage was not carried out to save the time of the busy employees and manager, as they showed their desire for drawing the future state maps by themselves at a later stage. This was done for the following two reasons: 1) The employees already had experience in creating future states of value stream mapping. 2) It was possible to carry out the latter stages of the model without the need for the results of this stage.
Stage 18	Define variables (C) – office future state	The recommended characteristics of skill set (Robey, Sales 1994), discretion (Robey, Sales 1994) and reward system (Galbraith, Downey et al. 2002) for the future state of each task activity were made depending on whether it is organic or mechanistic, as shown below:

Task Activity	Reward System	Discretion	Skill Set	Weak Vs Strong
e-sourcing e-collaboration & e-scheduling	Personnel rewards such as flexible 'cafeteria' benefits, lateral and upward promotions, equal opportunities, company's score card, training, group rewards, socialisation, training and skilful employee of the month reward, and skills based monetary pay	High	High	Weak
e-catalogue	Diagnostic controls (e.g. use of control to offer feedback on operations), and training, group rewards, socialisation, training and monetary pay	Low	Low	Strong

Stage	Variable related	Manager's Answer / Direct Observations
Stage 19	Define design recommendations in terms of the 7 management systems of the office	See Table (6.7) in section 6.3.5

Stage 11 in Table (6.6) is related to the drawing the current state value stream maps for each task activity of the Rolls Royce case study office. The earlier stages of the model presented in Table (6.6) showed that the Rolls Royce case study office has three organic task activities (i.e. e-sourcing, e-collaboration and e-scheduling) as well as one mechanistic task activity (i.e. e-catalogue). Based on this, the three organic task activities were mapped using the new form of value stream mapping whereas the mechanistic task activity was mapped using the conventional form of value stream mapping.

The reasons behind using action research while drawing the value stream maps of the office were explained within Section 5.2.2.2. The process of drawing the value stream maps, presented in Figures (6.7, 6.8, 6.9 and 6.10), using action research within this model followed a standard procedure for all the case studies. For more information on this standard procedure, go to the end of section 6.2.4.

One interview meeting was conducted with the team to draw the value stream maps of the task activities of the Rolls Royce case study case office. The meeting was carried out at Rolls Royce Plc in Derby, UK. For more information on this interview team meetings, please see the Rolls Royce case study data base shown in Appendix (M).

At the end of this meeting the current state Value Stream Map of each task activity of the office was drawn. These are shown in Figures (6.7, 6.8, 6.9 & 6.10). For more information or explanation of the various graphical icons used within the new generation of Value Stream Mapping, please see Appendix (I).

Figure (6.7) illustrates the current state of the new form of value stream mapping for the e-sourcing task activity.
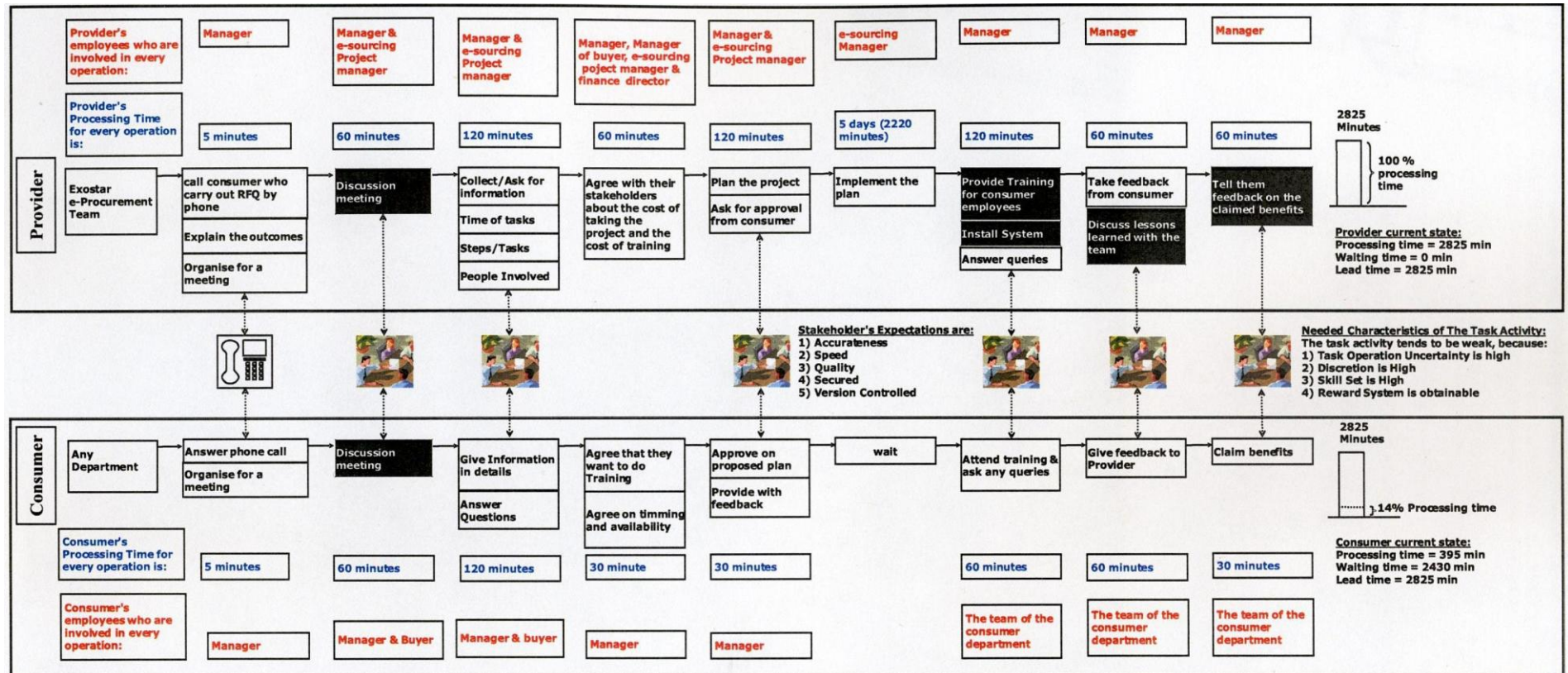
Figure (6.8) illustrates the current state of the new form of value stream mapping for the e-collaboration task activity.
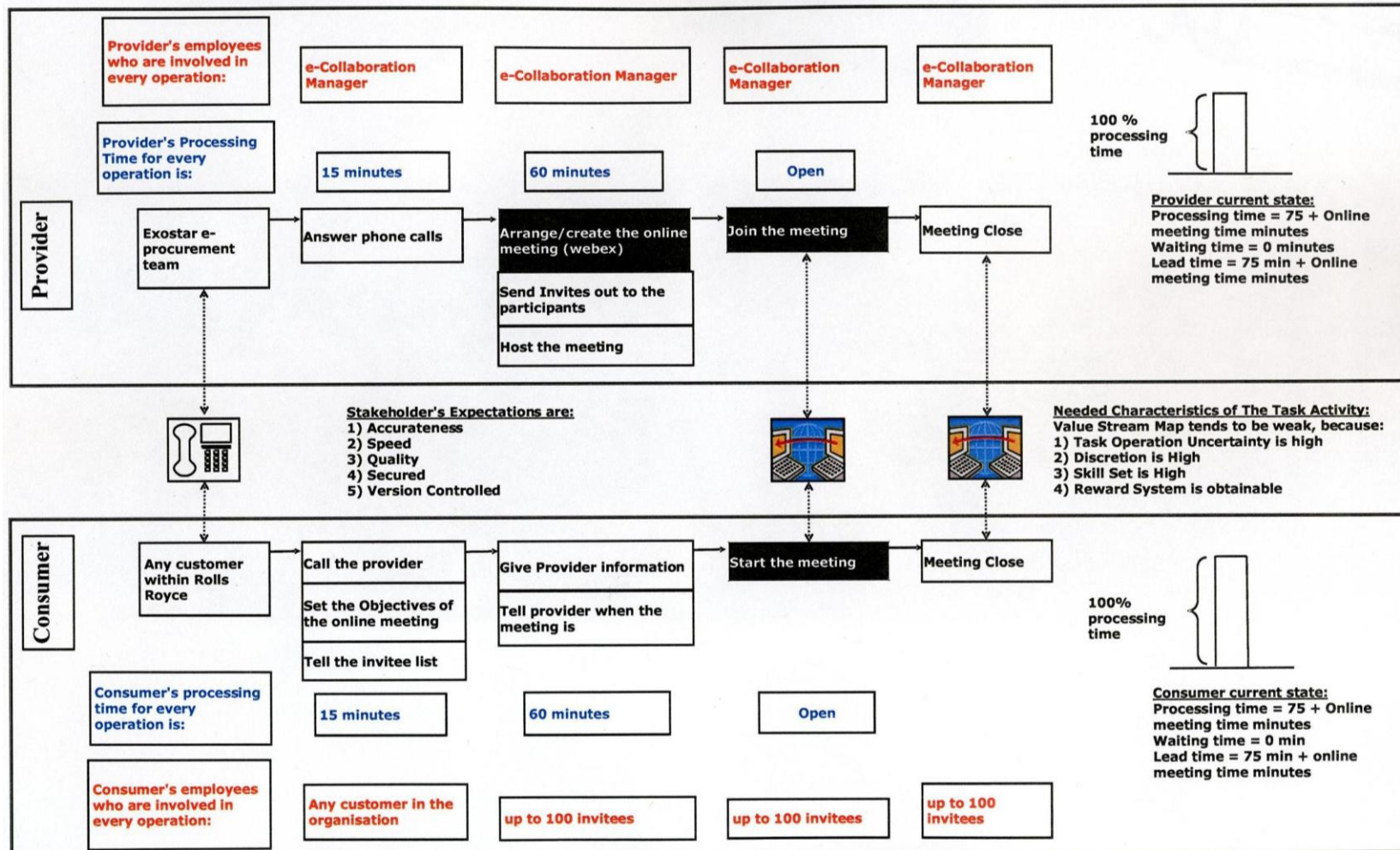
Figure (6.9) illustrates the current state of the new form of value stream mapping for the e-scheduling task activity.
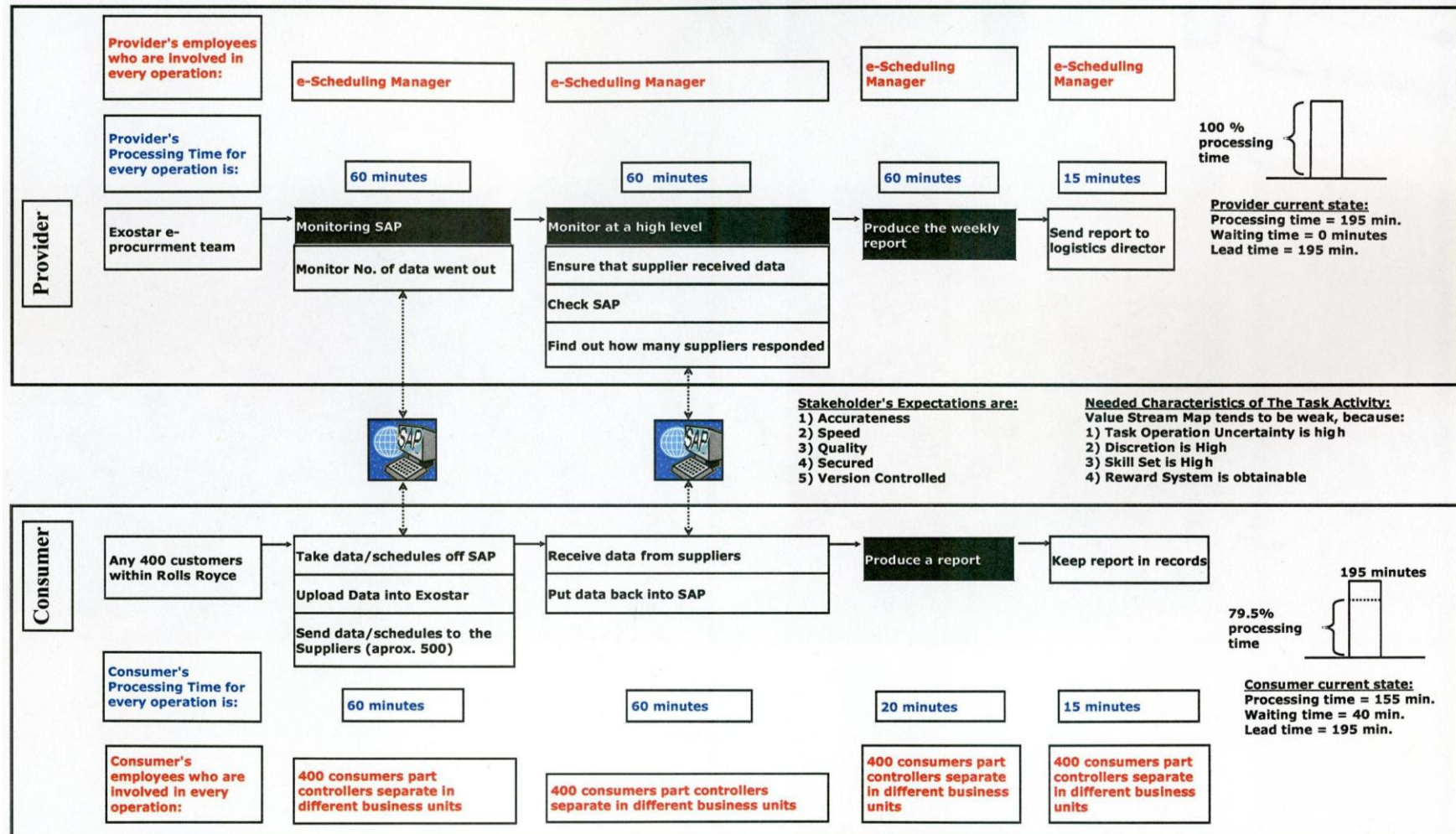
Figure (6.10) illustrates the current state of the conventional form of value stream mapping for the e-catalogue task activity.

Replenish Stock Order by any secretary within RR

Take the order		**Send order out to suppliers**		**Stock Arrival**		**Goods Receipt Officer Delivers Stock**
1X2		1X2		1X2		1X2

E-Catalogue Manager		E-Catalogue Manager & Suppliers		E-Catalogue Manager & Suppliers		Goods Receipt Officer
Phone		SAP		SAP		SAP

10 minutes　　　　15 minutes　　　　480 minutes　　　　20 minutes

0 minutes　　　　480 minutes　　　　10 minutes

Lead time = 1015 minutes
Total Processing time = 525

6.3.5 <u>Model Results – New Design Recommendations for the Rolls Royce Case Study</u>

Table (6.7) illustrates the new design recommendations of the office, which resulted from applying the model to the Rolls Royce case study. Table (6.7) presents the new design recommendations while showing a distinction between the current state of the office and the recommended future state.

Table (6.7) illustrates a distinction between the current state of the Rolls Royce office and the recommended future state of the office. The new modifications to the office are presented below in *italic* text.

	Current state characteristics	**Recommended characteristics of future state**
Leadership Style	<u>**The situational leadership style:**</u> The situational leadership style used in the current state of the office is participating (S3) situational leadership style.	<u>**The situational leadership style recommended is:**</u> S4 Delegating leadership style to lead employees who are classified to have high follower readiness level (R4).
Technology Characteristics	<u>**Thompson's Technology Type:**</u> • Intensive type for the e-sourcing, e-collaboration & e-scheduling. • Long-Linked for the e-catalogue.	<u>**Thompson's Technology Type:**</u> • Intensive type for the e-sourcing, e-collaboration & e-scheduling. • Long-Linked for the e-catalogue.
Employee Support	<u>**Heterogeneity:**</u> The products & services of the office are heterogeneous.	<u>**Heterogeneity:**</u> The products & services of the products of the office are heterogeneous. *This requires extra support to be given to the employees of the office future state.*
	<u>**Weak/Strong Situations:**</u> • e-sourcing, e-scheduling and e-collaboration are weak task activities. • e-catalogue is a strong task activity.	<u>**Weak/Strong Situations:**</u> • e-sourcing, e-scheduling and e-collaboration are weak task activities. *This requires extra support to be given to the employees of the office future state.* • e-catalogue is a strong task activity. *This does not require extra support to be given to the employees of the office future state.*
	<u>**Task Complexity:**</u> e-sourcing, e-scheduling & e-collaboration task activities are complex.	<u>**Task Complexity:**</u> e-sourcing, e-scheduling & e-collaboration task activities are complex. *This requires extra support to be given to the employees of the office future state.*

	Current state characteristics	**Recommended characteristics of future state**
Organising Activities / actors	**Organic/Mechanistic Nature:** • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.	**Organic/Mechanistic Nature:** • e-sourcing, e-collaboration & e-scheduling task activities are organic. **This requires extra support to be given to the employees of the office future state.** • e-catalogue task activity is mechanistic. *This does not require extra support to be given to the employees of the office future state.*
	Coordination modes used are: • For the office as a whole are planning, goal selection, task decomposition, managerial decision, priority order, unscheduled team meeting, standardisation and standardisation of norms. • For e-sourcing, e-collaboration, e-scheduling are schedules, mutual adjustment and interdepartmental teams. • For the e-catalogue are rules and schedules.	**Coordination modes used are:** • *For e-sourcing, e-collaboration, e-scheduling: face to face discussion, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and/or interdepartmental teams, because they have team interdependence.* • *For the e-catalogue: committees, planning, scheduled meetings, rules and/or schedules, because it is sequentially interdependent.* • *"First come/first serve", priority order, budgets and/or managerial decisions, because sharing dependency exists.* • *Notification, because flow prerequisite dependency exists.* • *Standardisation and/or participatory design to ask individual users, because usability dependency exists.* • *Goal selection and/or task decomposition, because fit dependency exists.*
	Constraints of Office Layout: Open layout with small segregators.	**Constraints of Office Layout:** Open layout.
	Structure: Flat structure.	**Structure:** Flat structure.
	Organic/Mechanistic nature: • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.	**Organic/Mechanistic nature:** • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.
Planning Work Units	**Thompson's Interdependence:** • e-sourcing, e-collaboration and e-scheduling are team. • e-catalogue is sequential.	**Thompson's Interdependence:** • e-sourcing, e-collaboration and e-scheduling are team. • e-catalogue is sequential.
	Value Stream Mapping tool: The current state value stream maps are shown in Figures (6.7, 6.8, 6.9 & 6.10) for each task activity.	**Value Stream Mapping tool:** *It is recommended to create future state value stream maps.*

	Current state characteristics	**Recommended characteristics of future state**
Assessing Individuals	**Management Control Systems:** • Behavioural Controls by manager's direct observation in terms of RR 13 Leadership behaviours. • Output Controls – Prospect Controls by having monthly meetings with the manager. • Output Controls – Prospect controls by having monthly team meetings with a senior director. • Output Controls – Customer feedback (e.g. surveys) • Personal controls in the form of a training plan done by them and the manager by linking the plan to their objectives.	**Management Control Systems for the office in general:** • Keep behavioural Controls, use manager's direct observation in term of RR 13 Leadership behaviours. **Management Control Systems for e-sourcing, e-scheduling and e-collaboration are:** • *Keep Output Controls – Prospect Controls by having monthly meetings with the manager.* • *Keep Output Controls – Prospect controls by having monthly team meetings with a senior director.* • *Keep Output Controls – Customer feedback (e.g. surveys).* • *Keep personal controls in the form of a training plan done by them and the manager by linking the plan to their objectives.* • *To have sophisticated integrative mechanisms in the form of team meetings to increase the office's response, flexibility & adaptation.* • *To have performance appraisals that offer broad scope information, flexible aggregations & interactive information as well as information given in a timely way.* **Management Control Systems for the e-catalogue are:** • *Operating procedures budgets and statistical reports.* • *Output and result controls.* • *Behaviour controls including standardisation, formalisation and rules.* • *Diagnostic controls by using control to offer feedback on operations.*
	Reward System: • Subjective yearly reward system that is based on numerical target set at the beginning of the year for each employee of the e-sourcing, e-scheduling and e-collaboration. Whereas, an objective reward system is used for the e-catalogue. • Employees are rewarded based on their behaviour too.	**Reward System:** • *For e-sourcing, e-scheduling and e-collaboration, personnel rewards such as flexible 'cafeteria' benefits, lateral & upward promotions, equal opportunities, company's score card, training, group rewards, socialisation, training & skills based monetary pay.* • *For the e-catalogue, diagnostic controls (e.g. use of control to offer feedback on operations), and training, group rewards, socialisation, training and monetary pay.*
Organisational Culture Characteristics	**Shared Values:** The organisational values of the culture of the office are quality, version controlled, accurate, commitment, involvement of the customer & highly secured. However, they are weak as there is a low resistance to change.	**Shared Values:** Keep the organisational values of the culture of the office, with a weak strength, because the office is predominantly organic.
	Competing Values Framework: Clan culture.	**Competing Values Framework:** Keep the culture as Clan.

6.3.6 Recommendations Made Following Testing the Model – Rolls Royce Case Study

Figure (6.5) illustrates an improved version of the model which was derived from testing the model using the Siemens case study. This improved version of the model was further tested using the Rolls Royce case study. This resulted in having a second version of the improved model. This second improved version of the model is shown in Figure (6.11). In other words, Figures (6.5 and 6.11) show the difference between the model of this study prior and post testing using the Rolls Royce case study. Those two figures also show how the patterns of the stages of the model, derived from the testing using the Siemens case study were not matched with the patterns of the stages of the model derived from testing the model using the Rolls Royce case study. Improvements to the first version of the improved model shown in Figure (6.5) are discussed below:

1. It is recommended to divide stage 1 shown in Figure (6.5) into two stages, because it is considered more advantageous to carry out some of these variables using a team of employees along with the manager. This stage is divided into stage 1 which aims to evaluate variables (A-1) as well as stage two which aims to evaluate variables (A-2) as shown in Figure (6.11). Variables (A-1) are ones that are needed to be evaluated by the manager of the office such as organisational culture, heterogeneity… etc. Variables (A-2) are evaluated using a team of employees which can be selected by the manager. This was done because the employees were considered to be the specialists who know the most about their own tasks. This improvement was done to ensure that the employees' goals would be in-line with the overall goals of the organisation. In other words, this is done to ensure that the business strategy of the office would be in line with the corporate strategy as advocated by Huczynski and Buchanan (2007). For instance, the variable task complexity can be evaluated by a team of employees rather than the manager only using the semantic differential scales. This will enable the use of statistical analysis to calculate averages of the answers of various respondents because statistical analysis can provide more accurate measures (Al-Hindawe 1996) about the complexity of the tasks of the office.

2. Add a stage after stage 5 (i.e. Evaluate the perceived task analysability… etc), shown earlier in Figure (6.5). The name of the added stage is "The effect of evaluating levels of task uncertainty & task analysability by relying…etc" as shown in stage 7 of Figure (6.11). In stage 5, the manager was meant to evaluate the levels of both perceived analysability within each task activity. However, according to Lincoln and Guba (1985), who state that if multiple observers can agree on a phenomenon, their collective judgement can be considered to be objective rather than subjective. Consequently, it is recommended to add a stage where the employees involved in the tasks as well as the manager can form a team to confirm the level of both perceived uncertainty and perceived analysability, which were indicated by the manager in the previous stages of the model. This was done because it was considered to reduce the subjectivity in measuring the levels of these variables.

3. Stage 6 (i.e. identify the type of each task activity carried out in the office in terms of mechanistic or organic) was carried out by the manager as shown earlier in Figure (6.5). It is recommended to carry this stage out by a team which consists of the employees and the manager of the office as shown in stage 8 in Figure (6.11). It was considered more appropriate to identify all the task activities of the office by this formed team rather than by asking the manager only for the following two reasons: 1) The employees who carry out the tasks daily are considered to know more than the manager about their own tasks. 2) Doing this task with more than one respondent will make the results more objective (Lincoln, Guba 1985).

4. Stage 8 (i.e. Divide each task activity in terms of risk) was carried out by the manager as shown earlier in Figure (6.5). It is recommended to carry this stage out by a team, which consists of the employees and the manager of the office as shown in stage 10 of Figure (6.11). This was recommended for the following two reasons: 1) The employees who carry out the tasks daily are considered to know more than the manager about their own tasks. 2) Doing this task with more than one respondent will make the results more objective (Lincoln, Guba 1985).

5. It is recommended to divide each mechanistic task activity of the office in terms of risk in stage 8 shown earlier in Figure (6.5). This was done by dividing the mechanistic task activities in terms of two risk levels (i.e. high and low), as shown in stage 10 of Figure (6.11). This was recommended because the division of task activities in terms of risk was merely limited to organic task activities. According to Robey (1991), a mechanistic system such as an aeroplane cockpit could be handled in a pure mechanistic way. Nonetheless, he argues that the high level of risk in flying an aeroplane (e.g. life threatening) results in reducing the mechanistic nature of the cockpit through having three human pilots regardless of their costs (Robey 1991). He advocated the importance of having organic human judgements within such a mechanistic system due to the high level of risk (Robey 1991). Although the Rolls Royce case study was predominantly organic, it had a mechanistic task activity within it. This helped in instigating this improvement to the model.

6. Stage 10 (i.e. variables (B) identified from the characteristics of the method… etc) was carried out by the manager as shown earlier in Figure (6.5). It is recommended to carry this stage out by a team which consists of the employees and the manager of the office as shown in stage 12 of Figure (6.11). This was recommended for the following two reasons: 1) The employees who carry out the tasks daily are considered to know more than the manager about their own tasks. 2) Doing this task with more than one respondent will make the results more objective (Lincoln, Guba 1985).

Figure (6.11) shows an improved version of the model derived from testing the model using the Rolls Royce case study. The modified stages are presented below in red colour.
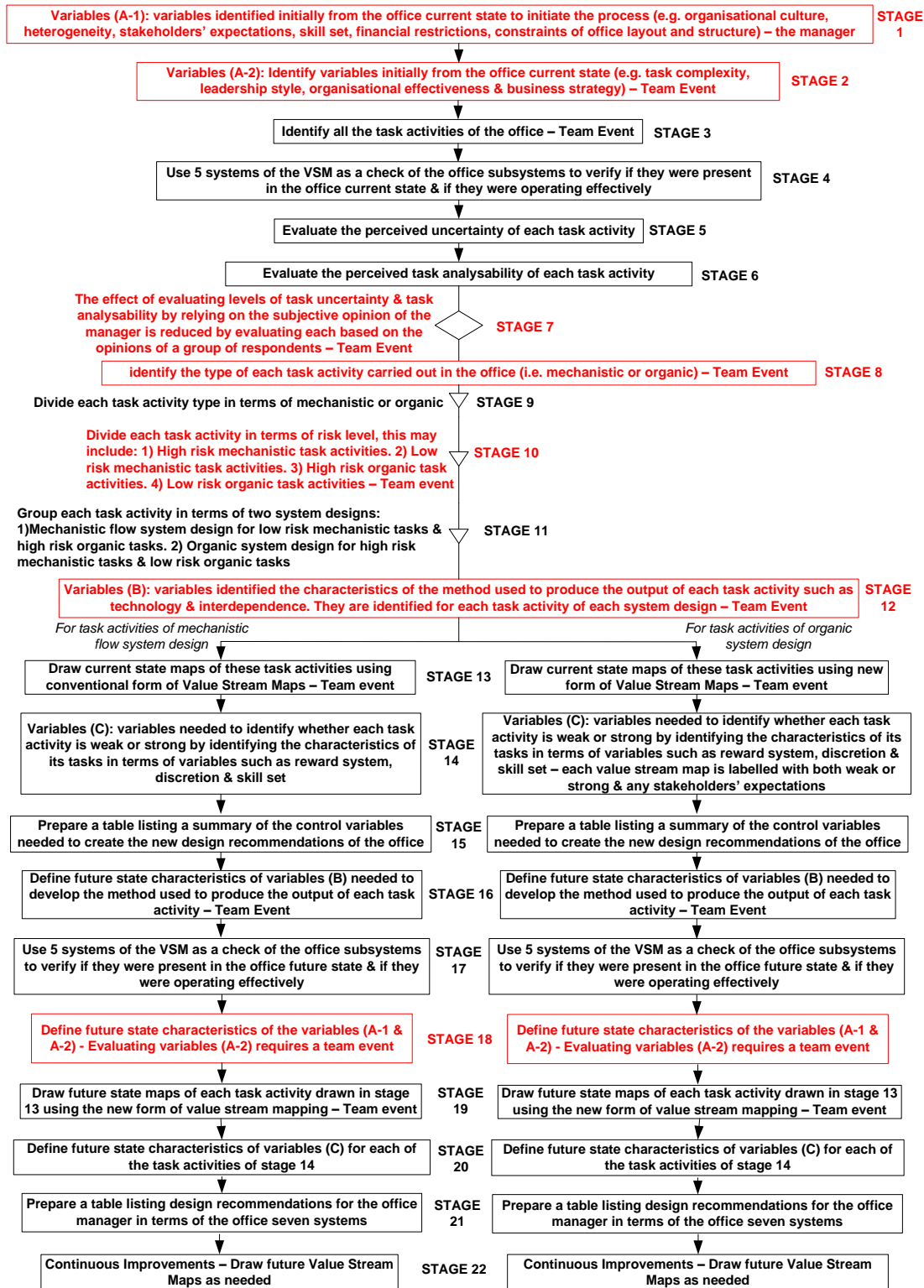
6.3.7 Discussion on the Rolls Royce Case Study

The current state value stream maps were drawn under supervision of the analyst in Stage 11 shown in Figure (6.5) using both the conventional and the new forms of value stream mapping. In order to save the time of the busy employees, the employees were advised to draw the future state maps of the office (i.e. stage 17) on their own. This was done for the following reasons: 1) The latter stages of the model did not depend on the results of the future state value stream maps. 2) The employees confirmed that they had good experience in drawing future state value stream maps. 3) The employees managed to draw the Value Stream Maps of the office autonomously.

A sample of how certain stages were identified from both the control variables of the office as well as the observed nature of the office is presented below in Figure (6.12) for stage 14 shown in Figure (6.5).

It was considered crucial to adopt the correct data collection and analysis strategy which could enable effective population of the model using mixed research methods. The multilevel model, presented in Figure (6.13), has been used to represent this strategy. This model was used for the following reasons (Tashakkori, Teddlie 1998): 1) It was perceived to be appropriate in providing a thorough view while populating the model. 2) It was considered to be congruent with the aim of testing the model. Testing the model prompted the need to use various sources of data from the case study to populate the model, then the data was analysed immediately to be able to proceed to the next step of the model. This was due to the linear and sequential nature of the model. The data collection and analysis was either qualitative, quantitative or a mix of both for each stage of the model. Every effort was made to maximise the use of quantitative methods while populating the model. However, it was inevitable to predominantly use qualitative methods due to the nature of the variables evaluated within the various stages of the model.

Figure (6.12) illustrates how interdependence was determined for the future state of the office based on both the mechanistic / organic control variables as well as the nature of the office.
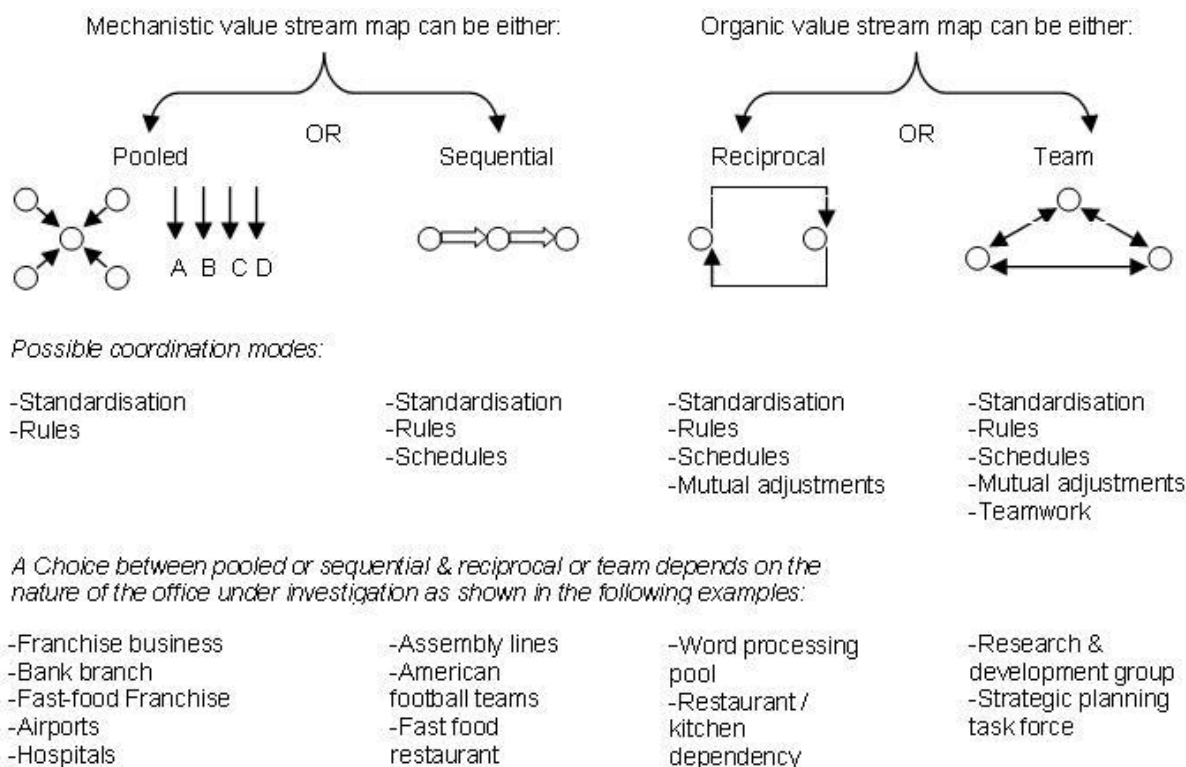
Source: Inferred from (Robey, Sales 1994, Huczynski, Buchanan 2007).

Since the data collection and analysis method used within the model was improved into mixed methods research. This has provided the opportunity to use triangulation of mixed methods research. Triangulation of mixed methods relates to the simultaneous use of quantitative and qualitative data within the study (Creswell, Plano Clark 2006). The type of triangulation of mixed methods that was used was the convergence model (Creswell, Plano Clark 2006). The convergence model refers to the use of mixed methods when both the quantitative and qualitative data are collected and analysed separately and the results are compared and contrasted to draw final conclusions (Creswell, Plano Clark 2006). This was adopted while testing the model using the Rolls Royce case study.

Figure (6.13) shows the multilevel model used in the Rolls Royce case study.
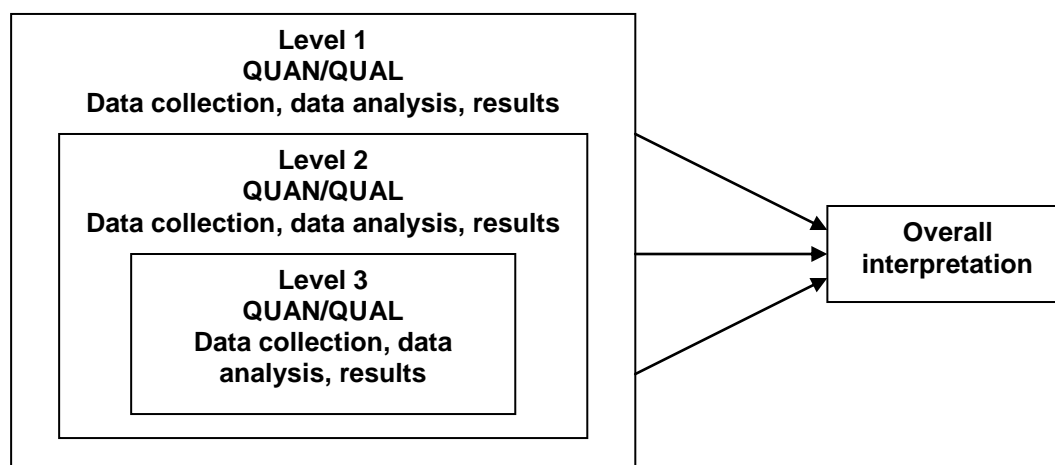
Source: (Creswell, Plano Clark 2006).

6.4   Cross Case Analysis

The testing of the model using two case studies was presented for each case study separately earlier in this chapter. This included the presentation of the data collection and analysis which allowed the patterns to emerge. Cross case analysis was also utilised while testing the model because it can improve both the generalisability of findings drawn from each case alone as well as the emergence of accurate and reliable theory that is stronger (Voss, Tsikriktsis et al. 2002). Furthermore, cross case analysis can strengthen the robustness as well as quality of the findings (Rowley 2002). Voss, Tsikriktsis et al. (2002) argue that a wide variety of tools and techniques can be used to deepen the understanding and explanation of structural settings of the phenomena of interest. Consequently, two tactics were used within the model testing phase to carry out the cross case analysis: 1) Literal replication, where two case studies exhibiting similar characteristics are evaluated to see if they would produce replicated results to support the model as advocated by Yin (2003). 2) Presenting the empirical evidence in a tabular display of evidence, as advocated by Miles and Huberman (1984). Table (6.2) and Table (6.6) showed clearly how each step of the methodology of implementation (i.e. the model of this study) was populated and evaluated for each case study. This helped in both clarifying and making comparisons between the case studies and their results. However, due to

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the high volume of text and graphs, which resulted while populating the model using each case study, the data were presented individually as shown in Table (6.2) and Table (6.6).

Both offices were internal consulting offices of large manufacturing organisations (i.e. Rolls Royce and Siemens), which operated in the energy sectors. The employees of both offices were familiar with the lean philosophy and its various tools and techniques particularly Value Stream Mapping.

Table (6.2) shows how three organic task activities existed within the Siemens office. These were also of low risk, which in return shifted the orientation of the design recommendations of the office into an organic system design as shown in stage 9 of Table (6.2). However, Table (6.6) illustrates how three organic task activities existed within the Rolls Royce office along with a mechanistic one which in return resulted in having a mix of an organic system design as well as a mechanistic flow systems design as shown in stage 9 of Table (6.6). This indicated that when the model was tested using each case study; it tended to generate more or less similar results. This was because similar design recommendations and findings were generated for each case study due to the fact that the design of both offices was based on predominantly organic system design. This was related to the fact that most of the task activities were organic. According to Yin (2003), this indicated that the model was supported, because testing the model using two case studies exhibiting similar characteristics produced replicated results. This replicability was considered to have strengthened the external validity of this research inquiry and its findings (Yin 2003). However, it is worthwhile to justify why there was little difference in the findings between the Rolls Royce case study and Siemens case study. The Rolls Royce case study had a mechanistic flow system design unlike the Siemens case study. This slight difference resulted from the existence of one mechanistic task activity along with three other organic ones in the Rolls Royce case study, whereas the Siemens case study consisted of only three organic task activities. This was related to the fact that offices are realistically a mix of organic and mechanistic tasks (Robey 1991). As a result this small difference in the findings between the Rolls Royce and Siemens

case studies was considered to have no influence on the literal replication of the findings of the two case studies exhibiting similar organic characteristics. This was because of the following two reasons: 1) Table (6.2) and Table (6.6) provide evidence of how the overall findings of the model derived from each of the case studies were still considered to be similar. 2) The differences between the findings of the case studies have been small and reasonably justified.

6.5   Discussion

A criticism of action research is related to the possibility that an organisation may not implement the researcher's solution if they were perceived critical of the organisation (Bryman 1989). A cautious approach was taken to handle any potential refusal of employees in implementing results in this action research. This was done by adopting action research with distinct foci on process consultation as advocated by Schein (1999). The adoption of process consultation in this research helped the research site employees gain the skills and the understanding of how to use the new generation of value stream mapping, which allowed them to develop the autonomy in improving their organisation (Schein 1999). Little evidence was found with regards to this limitation because the employees and the manager of the office were willing to fully collaborate. In order to save the time of the busy employees, the employees were advised to draw the future state maps of the office on their own. This was done for the following reasons: 1) The latter stages of the model did not depend on the results of the future state value stream maps. 2) The employees confirmed that they had good experience in drawing future state value stream maps. 3) The employees managed to draw the Value Stream Maps of the office autonomously.

As far as testing the model is concerned, the research generally benefited from the use of pure qualitative methods to populate the conceptual model using the first case study. It also benefited from the use of mixed methods to populate the first improved version of the model shown in Figure (6.6) using the second case study. However, as far as the model itself is concerned, this was done to overcome challenges in using pure qualitative research to populate the model. The research method used to populate the model was improved through the use of mixed methods research due to

its various advantages (Bryman, Bell 2007). This showed the importance of retesting the model using the second case study (i.e. Rolls Royce). The advantages of using mixed methods to populate the model are: 1) To reduce the dependence on the qualitative data as much as possible. 2) To write the questions in a rather direct and more focused way towards the required answer (e.g. 'could you list' type questions), which in return is considered to reduce the chance of respondents talking about irrelevant issues. 3) To enable the quantitative analysis of the data which is unlike the qualitative one tends to be more objective. 4) To base the new design of the office on less subjective measures and analysis which meant that the new design recommendations would be more objective. Also this indicated that the new design recommendations of the office would be more valid if a new manager is hired. As a result, every effort was made to maximise the use of quantitative data collection and quantitative data analysis. Consequently, two types of questions were used as a development to the nature of the questions used within the protocol itself. The first type of question was open-ended, which was formulated in a way that can help the respondent to give direct answers without the need for any in-depth analysis. The second type of question was the semantic differential scale. An attempt was made to measure the semantic differential scale quantitatively unless the nature of the semantic terms was not quantifiable (Harasym, Boersma et al. 1971). While analysing the scales, every effort was made to maximise the use of the quantitative aspect of the analysis (i.e. using percentages or statistical calculations). However if it was not possible to analyse them quantitatively, then they were analysed qualitatively. This qualitative analysis was carried out using two analytical conditions customised based on the answer of the variable the scale is attempting to evaluate. While developing these two conditions needed to analyse each pure qualitative scale, every effort was made to maximise the use of cited literature in order to reduce the subjectivity in their qualitative analysis. An example of this is shown in Appendix (J).

During the various interviews, most of the stages of the model were evaluated by the manager of office apart from drawing the value stream maps of each task activity of the office. The reason why most stages of the model were evaluated by the manager

was because this model aims to design the office based on the perception of the manager. On the other hand, the value stream maps were drawn by a team which consisted of the manager as well as other employees related to the tasks being mapped. This raised the issue of bias and error. The effect of this limitation was reduced by the utilisation of triangulation using different data sources such as observations and documents. In addition, it was considered necessary to ensure that the manager had considerable experience of the office and its tasks which was reflected by the number of years s/he worked in the office. This limitation of the model is further discussed in detail in Chapter 8.

6.5.1 Recommendations

After testing the model and gaining more understanding of the practical issues related to its applicability in office domains, certain recommendations were found to logically add value to the model. Two stages were recommended to be added after stage 1 (i.e. "variables (A-1)…etc"), shown in Figure (6.11). The name of the first added stage is "Identify the level of task complexity…etc". This added stage became stage 2 in the final version of the tested model shown in Figure (6.14). In addition, the name of the second added stage is "Identify the number of people required in any team event based on the task complexity level…etc". These stages were added because they were considered to help in identifying the number of people required to be involved while evaluating any stage of the model. It would be common sense to speculate that the more complex and variable the tasks of the office are, the more the number of people needed to evaluate the various stages of the model. This improvement to the model aimed to help the manager who will use this tool to identify the number of people needed to carry out any of the stages of the model based on the level of task complexity and variety that s/he perceives. For instance, if the office has a wide variety of different tasks then perhaps most of the employees of the office would be needed to populate the model, but if all the people in the office are doing roughly the same thing, then it may only be needed to ask a small number of people.

6.5.2 Statement of the Final Version of the Tested Model

The final version of the tested model is shown in Figure (6.14).

Figure (6.14) illustrates a final version of the tested model. The modified stages are presented below in red colour.

Variables (A-1): variables identified initially from the office current state to initiate the process (e.g. organisational culture, heterogeneity, stakeholder' expectations, skill set, financial restrictions, constraints of office layout and structure)	STAGE 1

Identify the level of task complexity   **STAGE 2**

Identify the No. of workers needed to populate the various stages of model based on the task complexity level   **STAGE 3**

Variables (A-2): Identify variables initially from the office current state (e.g. leadership style, organisational effectiveness & business strategy) – Team event   STAGE 4

Identify all the task activities of the office – Team event   STAGE 5

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively   STAGE 6

Evaluate the perceived uncertainty of each task activity   STAGE 7

Evaluate the perceived task analysability of each task activity   STAGE 8

The effect of evaluating levels of task uncertainty & task analysability by relying on the subjective opinion of the manager is reduced by evaluating each based on the opinions of a group of respondents – Team Event   STAGE 9

identify the type of each task activity carried out in the office (i.e. mechanistic or organic) – Team event   STAGE 10

Divide each task activity type in terms of mechanistic or organic   STAGE 11

Divide each task activity in terms of risk level, this may include: 1) High risk mechanistic task activities. 2) Low risk mechanistic task activities. 3) High risk organic task activities. 4) Low risk organic task activities – Team event   STAGE 12

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for low risk mechanistic tasks & high risk organic tasks. 2) Organic system design for high risk mechanistic tasks & low risk organic tasks   STAGE 13

Variables (B): variables identified the characteristics of the method used to produce the output of each task activity such as technology & interdependence. They are identified for each task activity of each system design – Team event   STAGE 14

For task activities of mechanistic flow system design | *For task activities of organic system design*

Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event	STAGE 15	**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**	
Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set	STAGE 16	**Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set – each value stream map is labelled with both weak or strong & any stakeholders' expectations**	
Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	STAGE 17	**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**	
Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event	STAGE 18	**Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event**	
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	STAGE 19	**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**	
Define characteristics of the independent variables (A-1 & A-2) needed to develop the office future state (Note: Evaluating variables (A-2) requires a team event)	STAGE 20	**Define future state characteristics of the independent variables (A-1 & A-2) - Evaluating variables (A-2) requires a team event**	
Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event	STAGE 21	**Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event**	
Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14	STAGE 22	**Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14**	
Prepare a table listing design recommendations for the office manager in terms of the office seven systems	STAGE 23	**Prepare a table listing design recommendations for the office manager in terms of the office seven systems**	
Continuous Improvements – Draw future Value Stream Maps as needed	STAGE 24	**Continuous Improvements – Draw future Value Stream Maps as needed**	

6.6   <u>Summary</u>

This chapter presented how the model of this study was tested. The testing was done using action research and multiple case study design strategies. Two similar case studies of offices exhibiting predominantly organic characteristics were presented individually for the aim of both testing the model and testing how organic tasks activities could be mapped through the new generation of Value Stream Mapping. The process initially started by testing the conceptual model shown using the Siemens case study and based on this, various critiques and recommendations for the model were made. This resulted in an improved version of the model. An improvement to the research methods, data gathering and analysis used to populate the improved version of the model was discussed while testing the model using the second case study. This involved the use of mixed methods research to eliminate the limitations of using a pure qualitative research method to populate the model. Therefore, this improved version of the model was further tested using the Rolls Royce case study which resulted in a second improved version of the model based on various recommendations. Thereafter, a final version of the tested model was presented. Various limitations within the research methods of this empirical phase were discussed and eliminated.

The next chapter presents the actual validation of the model which was to be carried out according to the validation plan presented in Chapter 5. It presents how the actual validation is carried out based on two perspectives (i.e. industrial and academic). It also outlines how the industrial validation is carried out by examining the new design recommendations for each office. This is done by asking the manager of each office about their opinions of the usefulness, novelty and benefits of the findings of the model in relation to the current state of their office.

7 ***CHAPTER SEVEN: Model Validation***

7.1 **Introduction**

Chapter 6 presented how the model was tested and refined using two case studies, which enabled the use of replication logic. Testing the model determined if the model actually produced change in the management of each office. These changes were presented in the form of new design recommendations for each of the offices as shown in sections 6.2.5 and 6.3.5. This chapter aims to validate the model in terms of two perspectives.

The first perspective is industrial, which aims to determine the usefulness of the model and examine the managerial perception related to whether these changes produce improved performance and improved employee participation. The second perspective is academic, which aims to stress the academic viability of this research. This chapter also presents how the criteria, which are required to guide the validation of the model in terms of each perspective, are adopted. The implementation of the strategy adopted to gather the data required to validate the model from an industrial perspective, which was discussed in section 5.3.3 in Chapter 5, is also presented. As a result of this validation, final recommendations and improvements are made to the model. These improvements lead to a final statement of the model. The two perspectives used to validate the model are presented separately as shown below:

7.2 **Validation from an Industrial Perspective**

Wallis (2008) argues that validating a theory in a practical sense (i.e. outside academia) by gaining recognition of external professionals would provide another higher meaning for the validation of the theory. This was also considered to strengthen the construct validity of this research by asking an expert about their opinion of the usefulness of the model (Yin 2009). This industrial validation aimed to validate various issues related to the model. These included the model flow, model steps, office management systems used within the model and the new

recommendations related to each of the case studies (i.e. the results of applying the model to each of the case studies as shown in sections 6.2.5 and 6.3.5).

7.2.1 The Actual Validation from an Industrial Perspective

The design of the adopted methodology used to empirically validate the usefulness of the model was discussed in detail in section 5.3.2 in Chapter 5. The actual validation was carried out by asking the managers of the offices who contributed with a case study for testing the model. This was done by asking the opinions of two managers at Rolls Royce and Siemens about the design recommendations for each of their offices because they were the people who provided opportunity to populate the model during its testing phase. The structured criteria, which were followed to validate the model, were presented in section 5.3.1. The criteria included the impact of the model on the performance of each of the case study offices, the usefulness of the output of the model and the novelty of the model and its output. Since this validation was carried out by asking the opinion of the manager of each office, the data collection technique used was interviews. The administration of the interviews was similar for both case studies. This administration is explained below:

7.2.1.1. Interviews

One interview was carried out with the manager of each case study to validate the model and its findings. Each interview was also face-to-face to obtain information, beliefs or opinions of the interviewee (Ghauri, Gronhaug 2005). Each interview was also in-depth, because it allowed the researcher to gain a more accurate and clearer picture about the facts, opinions, behaviours and position of a respondent as advocated by Ghauri and Gronhaug (2005).

Each interview was semi-structured, because a series of questions were asked as part of an interview protocol (Creswell 2003) as shown in Appendix (P). This allowed the researcher to change the sequence of the questions providing him with the ability to ask more questions as he picks up on issues mentioned by the respondent (Bryman, Bell 2003). Also the semi-structured interview allowed the researcher to carry out cross-case comparability between the two cases (Bryman, Bell 2003) as

shown in section 7.5. An interview protocol shown in Appendix (P) was prepared for each of the case studies to help in structuring the interviews (Creswell 2003). Its first page contained general information such as the name of the firm, the name of the interviewee and his/her position. The questions of this case study were mainly open to reflect their qualitative nature. Open-ended questions could provide the respondent with the freedom to answer without being constrained (Ghauri, Gronhaug 2005).

It is worthwhile to note that this validation was carried out by asking the manager of the Rolls Royce and Siemens offices similar questions. One of the main difficulties whilst constructing the interview protocol was related to identifying a simple method to present a comprehensive view about the model, its findings and various tools and models used within it. This was due to the complex nature of the process used to (re)design the office in this model which might be related to the interlinked nature of the variables. This complex nature resulted in facing difficulties in identifying a simple way for presenting the model of this study without compromising the rigor of the tool and its findings. The manager of the Siemens office was the first to be interviewed. After carrying out this first interview, he criticised and complained about the complexity of the method used to present the data within the interview protocol. This information was related to the model and the new design recommendations of the office which was in the introduction of the interview protocol. This instigated the need to improve the method used to present the information from one case study to another. Consequently, this information was modified for the second interview, which was carried out with the Rolls Royce manager. The representation of the information was improved based on the recommendations and feedback of the first interview with the Siemens office manager. This is discussed in more detail in section 7.3.

7.2.2 Results of the Actual Validation from an Industrial Perspective

The results of the actual validation process from an industrial perspective are explained below for each of the case studies:

7.2.2.1. Siemens Case Study

The standard procedure for carrying out interviews, which was explained within section 6.2.2.1, was used to conduct the interviews needed to validate the model using the opinions of the manager of the Siemens case study office.

The number of interviews, which was carried out to validate the model, was one. This interview was guided by the interview protocol shown in Appendix (P). The nature of the questions used was open questions.

The manager had a considerable experience of 43 years in Siemens. The usefulness of the overall methodology of implementation was described by the manager as shown in Table (7.1). In addition, the strengths and weaknesses of the methodology of implementation and its various management systems were described by the manager as shown in Tables (7.2 & 7.3). Various recommendations for the methodology of implementation as well as its various management systems were made by the manager as shown in Table (7.4). Furthermore, Table (7.5) illustrates that the manager of Siemens agreed to exclude certain variables from the model as was suggested during the model testing phase shown in Chapter 6.

Table (7.1) shows the usefulness of the methodology of implementation, its various tools & management systems as stated by the manager of Siemens.

The manager described the usefulness of the methodology of implementation as:
"It is useful to know what is right and what is wrong, if you are going in the right direction… if you are going in the wrong direction…"
"It could be very helpful as long as the manager understands and the business understands what the benefits to get out it …are… does it fit to all office applications?! But of course it could fit… it fitted to what we did in here… okay… its formed the expected parts of it… many parts of it… you got the culture part of it, you got the team working part of it… okay… and everything like that…. But as I said, If I was to get the big picture, the big picture of the exercise was good thinking from the university… good results at the end of it… hopefully, whatever you do with it, somebody would ask you to go for it as well."
"What I like about it… it is not just about looking at the waste in the process, reducing time in the process, okay… it's looking at the whole office and how it should work… I like that… that is different..."
The manager described the usefulness of the main management systems of the office represented in the mind map as:
"Very useful"
"…Very helpful"

The manager described the usefulness of the new generation of value stream mapping as:
"Like I said… to use it and everything like this… it is good"
"Yah… Yah very easy"
"Yah… Yah… pretty helpful"
"I think so… yah… and any value stream mapping will do time and cost reduction… so this will do it"
The manager described the usefulness of the new design recommendation as:
"I find it very useful"

Table (7.2) shows the strengths of the methodology of implementation, its various tools & management systems as stated by manager of Siemens.

The manager described the strength of the methodology of implementation and its new design recommendations as:
"… The strengths is that it is going to give the manager some idea of the strengths and weaknesses of his team… the strengths and weakness of his office and everything like that… it makes him look at what he has got at the moment and what needs to be changed about the office in the future… but there is lots of other tools in the world that does that as well… for example… for looking at different cultures and everything like that… but in terms of redesigning offices by managers in terms of the aspects you discussed, there is not a tool that does that all together… there is individual tools… I mean in here you get all the best out of that in one methodology that we can use… instead of him looking... if he probably knows about that one… he has to look for one like this… and one like this without missing any."
The manager described the strengths of the main management systems of the office represented in the mind map as:
"… The management systems themselves, I think that they pretty much covered everything without any thing missing from what I can see."
"I like mind maps, basically speaking… I can understand the mind map… coming back to what I was saying… I can pick that pick and I can relate to it… okay… when you map something new up… I can understand it in a mind map…"
The manager was asked if information related to redesigning the office was missing and not present in this section, he answered: *"No"*
The manager described the strengths of the new generation of value stream mapping as:
"Its design, visual, using symbols… can map tasks that are uncertain, complex…and everything like that."

Table (7.3) shows the weaknesses of the methodology of implementation, its various tools & management systems as stated by the manager of Siemens.

The manager described the weaknesses of the methodology of implementation & its new design recommendations as:

The manager criticised the detailed step by step flow chart of the methodology of implementation by stating: *"There is no sort of defined difference between stages of current state and future state, and so if I was reading this, I would not know where the current starts, where the current state finish, where the future state starts and where the future state finish. It's not too bad to have 23 stages… if you got a top level… So if that is the detail for the top level, then it is fine"*
"On this very detail, I do not know if it would be over detailed for a group of people, who wants to actually improve their own office." *"Without a break down from a more top level, it is probably too complex."* *"This is quite complex to get the data, but you are going a lot deeper in here. This is about… what makes a good team, what makes office tick over… you know… what the office is all about… it's not just reducing the waste, its making the office work effectively, the culture of the office and everything… which is far greater that what value stream mapping just cover…"*
"… It's probably not complex, that we won't understand what it's been used for. It probably needs to be complex to get what you want out of it. *"I think that if any weakness would come first from what we have been discussing… yah... complexity… how you gonna portray it… how you gonna make it easy to understand… how you gonna make it… like I said… why shall I do it… what's the benefits… the tool itself is there… okay, its complex… I have to simplify it, and I have to portray and it's not gonna be a massive task to do that… I am gonna have to pick this pick and be able to understand it from an hour reading it fully… it's all there…"*
"… It needs to be in simple terms sort of thing… Its academic sort of thing… you know… some of that wording probably needs a dictionary to understand … it's not easy reading"
The manager described the weaknesses of the main management systems of the office represented in the mind map as:
"Weaknesses are the terminology… DSS! okay… I am just saying it does not mean anything to me… all I am saying… I can look at half of your terminology and I could not understand the majority of them."

Table (7.4) shows recommendations for improving the methodology of implementation & its management systems drawn by the manager of Siemens.

The manager recommended changes to the methodology of implementation as:
"Simplicity… making it easier sort of wording
"Why shall we use it over other used tools… why shall we use this tool and not another tool, if I want to redesign the office, I am the manager, I make the decision, what are the benefits…"
"training is important, because that is quite in depth… its quite in depth talk"
The manager was asked if any of the main management systems of the office represented in the mind map needs to be modified or excluded, he answered as follows:
"No… no… I think this comes with time, if you use this tool over period of time, you would learn… you would learn if it's right or wrong…"

"Regarding similar variables that are repeated in terms of support… I think yes… if there is a too big cross over between those legs (i.e. pointing his finger at the employees' support management system) and those (i.e. pointing his finger at the leadership style and organisational culture management systems), if this is (i.e. pointing his finger at the employees' support management system and its variables) talking about something different to what those (i.e. pointing his finger at the leadership style and organisational culture management systems) are talking about, okay… fine… but, because both talk about how much support you are giving to the employees, you can probably cut some of these down (i.e. pointing his finger at the variables of the employees' support management system) to those (i.e. pointing his finger at the leadership style and organisational culture management systems…)."
"What you need to do is to look to see if it is too much (i.e. variables of the employees' support management system), if it's too much the same… If these are nearly the same, okay… then yah… simplify it… if it is very much the same, then yah reduce it… Just do not lose some of these (i.e. pointing at the management system of the employees' support and its variables) if there is not a big divide… for instance, if there is a big divide between let's say the history of the office… okay.. and you cannot fit it in there (i.e. pointing at the leadership style and organisational culture)… and it's important to your process, the history of the office, make sure it is captured."
"Anything that is common, you can put it in one, otherwise, you are duplicating…"

Table (7.5) shows that the manager of Siemens agreed to exclude certain variables from the model as was suggested while testing the model in Chapter 6.

Excluding DECISION SUPPORT SYSTEM from the technology characteristics management system:	
Manager's opinion about excluding this variable:	*"Yah… I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding TRUST from the employees' support management system:	
Manager's opinion about excluding this variable:	*"No… because, it happens that people do not possibly trust each other... yah… this office is a small office, very small team… the relationships in this office have been built over a period… are people trusted with information… so trust is important… because, even though that you may think that people trust each other… but believe me… okay… it does help."*
Does manager opinion agree / disagree with justification used to exclude it from model?	No the manager does not agree. Nonetheless, it is still recommended to exclude this variable, because it is assumed that trust exists between the employees in the office to avoid shifting the scope of this study into psychological issues (Dirks, Ferrin 2001). In addition the employees are regarded as a mature workforce that are gathered for a common purpose
Excluding HOSTILITY from the employees' support management system:	
Manager's opinion about excluding this variable:	*"Yah… I agree with the fact it should be excluded"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding JOB SATISFACTION from the employees' support management system:	

Manager's opinion about excluding this variable:	*"It is important… that is morale… job satisfaction is like moral… if moral is gone, it is gonna affect your team… so it's important that the manager keeps that team, focused and happy as much as possible"*
Does manager opinion agree / disagree with justification used to exclude it from model?	No the manager does not agree. However, it is still suggested to exclude it for the following reasons: 1) It has little influence in office design and was dropped out to avoid shifting the study into subjective psychological issues related to job satisfaction (McKenna 2006). 2) The aspects of job satisfaction that are related to employee support are already covered in the model within the supportive/relationship behaviour of the situational leadership model (Huczynski, Buchanan 2007).
Excluding CREATIVITY from the employees' support management system:	
Manager's opinion about excluding this variable:	*"No… I think that creativity, pressure and job satisfaction cross with each other… creativity as far as the team is concerned is about moral… it is about getting the most out of the team… I am not saying it should be in the tool, but I think that creativity is the welfare of that person… so it is related…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	No the manager does not agree. Nonetheless, it is still suggested to exclude it from the model for two reasons: 1) It is covered within the Stakeholders' expectations variable in the Choice of Work Unit Planning office management system shown in Figure (7.2). If the Stakeholders of the office expect the office to be creative, then this variable will be considered within the design by following the guidelines of the time-pressure creativity matrix created by Amabile, Hadley et al. (2002). 2) It is also indirectly covered with the organic or mechanistic variable of this model (Robey, Sales 1994), as shown in stage 6 of the model as shown in Figure (6.1). The reason why the manager perceived it important in this case study is because creativity is one of the expectations of the stakeholders of Siemens; this makes creativity important for this office. In addition the nature of the office is an organic internal consulting office. This does not mean that the need for creativity in the model needs to be generalised for all office types. As for instance, a finance or customer order processing type office is unlikely to require creativity.
Excluding PRESSURE from the employees' support management system:	
Manager's opinion about excluding this variable:	*"Redesigning the office is for a shared load, making sure that no persons are overloaded and another person that is not under pressure… pressure, moral, job satisfaction, the last thing you want to know is a person getting off work because they are stressed etc. okay… So the welfare of your team is number one priority."*
Does manager opinion agree / disagree with justification used to exclude it from model?	No the manager does not agree. Nonetheless, it should be excluded from the model, because it is considered that the pressure experienced by the employee is linked to creativity as advocated by Amabile, Hadley et al. (2002), which has little influence in office design, unless creativity was to be one of the stakeholders' expectations of the office or if the office nature was organic with a big emphasis on creativity.
Excluding GENDER MIX from the employees' support management system:	
Manager's opinion about excluding this variable:	*"Yah… It's not really required, this variable… yah… yah… only if a lady got pregnant but that's about it"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding HISTORY OF THE OFFICE from the employees' support management system:	
Manager's opinion about excluding this variable:	*"Yah… I would not say it's important"*

Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding DIFFERENTIATION & INTEGRATION from the organising activities/actors management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding CENTRALISATION VS DECENTRALISATION from the organising activities/actors management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding FORMALISATION AND STANDARDISATION from the organising activities/actors management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding SIZE from the organising activities/actors management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding FORMAL OR INFORMAL from the organising activities/actors management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees
Excluding TASK UNCERTAINTY from the planning work units management system:	
Manager's opinion about excluding this variable:	*"Yah I agree…"*
Does manager opinion agree / disagree with justification used to exclude it from model?	Yes the manager agrees

7.2.2.2. Rolls Royce Case Study

The standard procedure for carrying out interviews, which was explained within section 6.2.2.1, was used to conduct the interviews needed to validate the model using the opinions of the manager of the Rolls Royce case study office.

The number of interviews, which was carried out to validate the model, was one. This interview was guided by the interview protocol shown in Appendix (P). The nature of the questions used was open questions.

The manager had a considerable experience of 15 years in Rolls Royce. The results of the validation from an industrial perspective using the Rolls Royce case study are presented in Appendix (Q). These results are summarised in five tables. These tables are: 1) A table that shows the usefulness of the overall methodology of implementation as described by the manager of the Rolls Royce office. 2) Two tables that show the strengths and weaknesses of the methodology of implementation and its various management systems as described by the manager of the Rolls Royce office. 3) A table that shows the various recommendations to the methodology of implementation as well as its management systems as advocated by the manager of the Rolls Royce office.

7.2.3 Inspecting the Novelty of the Model from an Industrial Perspective

The aim of this section was to cross check the novelty of the model and its findings based on the opinions of both the manager of the Rolls Royce office and the manager of the Siemens office. It is worthwhile to note that the manager of each office had a substantial consulting experience of various types of offices across their organisations. They also had a very good understanding of the offices they operated in, which was reflected by their long work experience. Table (7.6) illustrates how the novelty of the model was validated from an industrial perspective using the Siemens and Rolls Case Studies.

Table (7.6) shows how the managers of each case study confirmed the novelty of the various parts of the model.

SIEMENS MANAGER	ROLLS ROYCE MANAGER
The manager was asked to state how novel the methodology of implementation for redesigning their office is and how novel its new design recommendations are:	
"Yes it is completely novel."	*"I think It's really good because it looks at the whole system… holistic view…"*
"No, it's completely new approach. To me completely new approach… okay… I have not seen that type of approach here. I have never done anything like that in this level of detail"	*"It is novel, because they do not look at that… a total model like that in normal procedures."*
	"Very different"
The manager was asked to state how novel the various management systems of the office, shown in the mind map, are:	
"Very novel"	*"This model here shows you everything in one go… it is what to consider basically and how they link up, so this is showing you the link as well... so the novelty is in showing the design of the office in terms of the combination of those seven systems."*
The manager was asked how novel the new generation of Value Stream Mapping is:	
"I think it's pretty good… I want someone to have a look at it, because at the moment we are doing value stream mapping within transactional and offices environment of the organisation of these offices… okay… we are doing at the moment for the offices… the technique is novel… we created some ideas ourselves, and using standard stuff… we'll get him to have a look sometime because he is not in… he is away for a week."	*"It is novel because you broke down in terms of the people… you got the black boxes, the provider/consumer…"*
The manager was asked if they have done this new version of value stream mapping, he answered: *"Not in this end… No…"*	

7.3   <u>Discussion of the Actual Validation from an Industrial Perspective</u>

Although the manager of each office had a great deal of experience in consulting and restructuring offices throughout the whole of the organisation, it was considered that there may be limitations related to their lack of knowledge and/or bias in validating the model of this study and its findings. An attempt was made to reduce the manager's bias by stating to them the importance of their honest feedback and constructive criticism. In addition, it was attempted to cross check the feedback of one manager with another during the interviews as shown in section 7.5. Although

the method used to validate the model of this study using the opinions of the two managers provided insights about the model validity, the limitations (e.g. limitations related to the use of a small sample of interviewees and limitations related to bias and error due to the use of qualitative research) inherent within it are still considered to put a case for future work. It is therefore recommended to carry out the model validation using different approaches such as quantitative methods, because quantitative methods will not be as dependent on the opinions of the managers to validate the model.

Qualitative research was used to validate the model of this study as well as its various tools and management systems. However, the main focus was on the validity of the new design recommendations which resulted from testing the model in the Siemens and Rolls Royce case studies shown in Chapter Six. These recommendations were validated by the manager of each relevant office in a face to face interview. Difficulties arose in finding a user-friendly way for presenting to the manager of each office information related to the tool, its management systems, its findings (i.e. new design recommendations of the office) etc. It was found to be challenging to present this information in a simple way without compromising the rigour of the model and its findings. After carrying out the first interview with the manager of Siemens, he criticised and complained about the complexity of the method used to present the data within the interview protocol. This instigated the need to improve the method used to present the information from one case study to another. Consequently, this data was represented for the second interview, which was carried out with the Rolls Royce manager. The representation of the information was improved based on the recommendations and feedback of the first interview with the Siemens office manager. This was done to ensure that the validation, which was to be carried out using the opinions of the Rolls Royce manager, would be more simple, accurate and direct. The main improvement to the presentation of this information was related to representing the new design recommendations for the Rolls Royce manager shown in section 6.3.5 in terms of two audiences. These audiences are: 1) Industrial audience who was presented with the new design recommendations of the office using simple language. 2) Academic audience who

was presented with the new design recommendations of the office using academic language.

Table (7.7) shows the improvements to the interview procedure following and resulting from the Siemens interview.

Weaknesses of 1[st] interview protocol as stated by manager of Siemens	Recommendations/modifications for the presentation of the interview protocol used in the Rolls Royce Interview
"If someone was to pay you for doing it as a consultant, they must know the benefits… what is it in for me? And what benefit do we get? Very… very clear that is… why shall I do this? And benefits do the company get out of it."	At the beginning of the interview protocol an aim of the tool should be listed, in addition, the benefits of using the tool, including: • Effectively design the office by its manager. • Allow the manager to diagnose major aspects of the office (e.g. leadership, culture, organisation, planning, employees' support, employees' assessment and technology), which had a great deal of attention by various renowned organisational design models (e.g. Viable System Model, Galbraith Star Model & McKinsey 7-S Model). • Design the office in terms of 7 systems (i.e. leadership, culture, organisation, planning, employees' support, employees' assessment and technology), each one is considered to fulfil a purpose in the office. • Introduce continuous improvements, which offer tangible benefits to the new design by using value stream mapping – eliminating waste and improving processes. • Create a new form of Value Stream Mapping along with the traditional form. The aim of the new form is to map organic tasks (i.e. tasks with high complexity, high uncertainty & low analysability), which cannot be mapped using the traditional form.
"…Far too complex, but the bigger picture might not be complex as long you are absolutely clear what the benefit is you get out of it as a business and that is the bit, which you need to portray."	Reduce this complexity by: • Representing the characteristics of the current state of the office as well as the recommendations for the future state of the office in a tabular format, one for the current state and one for the recommendations of the future state. • This tabular format will allow the manager to compare current state with future state recommendations in a much more visual friendly layout. • Use graphical representation as much as possible. • To reduce the number of the variables included in the model, by getting rid of the variables that were excluded from the model during testing, because their exclusion was validated in the Siemens case study.

Weaknesses of 1st interview protocol as stated by manager of Siemens	Recommendations/modifications for the presentation of the interview protocol used in the Rolls Royce Interview
"If I were to go quickly… some of the wording behind it, I would question how to understand it… I would have to read on all the terminology… but after you said what it is… its fine… I can understand it now."	• Rather than reducing the use of academic terms. It is considered more effective to represent the two tables (i.e. current state and future state recommendation tables) in terms of two columns. • The first column explains the characteristics of each management system of the office for an industrial audience such as the managers of the offices, where straight forward industrial friendly language is used with simple messages. • The second column explains the characteristics of the management system of the office for an academic audience, where each technical and academic language and terms are used to explain the analysis.
"… I can look at half of your terminology and I could not understand the majority of them."	Keep on using a dictionary in the form of a glossary of terms for any academic terms used.

It is worthwhile to note that the manager of Rolls Royce agreed that the variable task uncertainty should be deleted from the choice of work unit planning office management system. The manager considered that task uncertainty was a duplicated variable because its effect was already considered within this system through the incorporation of value stream mapping and Thompson's (1967) interdependence. This was evident when the manager of Rolls Royce stated:

"Yah, it (i.e. Task Uncertainty) is repeated… it is duplication that… so you can take it out…"

Source: the manager of Rolls Royce on 13/09/2010 as shown in Appendix (M).

The manager was the only person interviewed in each case study that was considered to be inevitable. These were considered to be limitations which had to be accepted. However, they also put a case for future work which was beyond the time limit of this study. It is therefore recommended to carry out a longitudinal study for an office under (re)design. This will give an opportunity to use this tool while employing quantitative measures (i.e. to measure employee satisfaction and/or office performance) to compare between the new and old designs of the office.

7.4   Validation from an Academic Perspective

The aim of this validation was to validate how this research was carried out and discuss convincing issues related to the academic viability of this work. It also aimed to discuss any limitations (e.g. small sample size, small set of offices etc). In addition, it aims to discuss how every effort was made to reduce the effect of the limitations of this research. For example triangulation using multiple data sources was utilised to reduce any limitations related to having a small sample of interviewees.

An attempt was made to critique the findings and results of the various phases of the methodology adopted in this research inquiry. This critique attempted to strengthen the academic viability of this research in terms of various aspects. These aspects are presented below:

- The theoretical findings of the literature review were confirmed and complemented empirically by carrying out a pilot study phase. This pilot study phase confirmed the results of the literature review and expanded on them. The results of the basic themes of the pilot studies tended to agree with the list of variables identified from the literature review as shown in section 3.2.7 in Chapter 3. However, five new variables emerged from the analysis of the pilot study phase as shown in Table (3.9). Although these variables were not visible to the researcher while carrying out the initial literature review search, they were indirectly discussed by various authors on the subject (Robey 1991, Robey, Sales 1994, Huczynski, Buchanan 2007) as they were describing various types of Thompson's (1967) interdependences and technologies.

- The office management systems, which were identified empirically from the pilot studies, were also theoretically compared with the management systems used within three other well-known organisational design models. The aim of this was to compare the results of the pilot studies with rival theories (Yin 2003), which strengthen the internal validity of this research. This was done by using the constituent systems of three well-known organisational design models (e.g. VSM,

Galbraith Star Model and McKinsey 7-S) as a check of the subsystems of the office to determine if they were present. The results of the common organising themes of the pilot studies (i.e. office management systems) tended to agree with the work of authors of three different organisational design models (Galbraith, Downey et al. 2002, Beer 1985, Waterman, Peters et al. 1980), as shown in section 4.4 in Chapter 4.

- The conceptual model of this study was tested using a multiple case study design and action research. This was done to improve the conceptual model and refine it as advocated by Eisenhardt (1989).

- The recommendations and modifications to the model, which resulted from testing the model, were validated using the opinions of the manager of each case study. For instance while validating the model from an industrial perspective, the manager of each office was asked to confirm the modifications to the model of this study which were related to the exclusion of certain variables from the model as shown in Table (7.5).

- The results of testing the model using the Rolls Royce case study shown in Chapter 7 confirmed that Magnusen's research (i.e. a realistic viewpoint of offices in terms of a mix of organic and mechanistic) (Robey 1991, Mullins 2007) can be successfully used in this model to (re)design offices. The results of applying the model to the Rolls Royce case study presented how three organic task activities as well as one mechanistic task activity were redesigned within the office in parallel.

An attempt was made to use triangulation of various sources of data throughout the various empirical stages of this study as advocated by Eisenhardt (1989) and Patton (2002). These sources of data included interviews, direct observations and documents. For instance, the data collection techniques used for the pilot study phase were direct observations and semi-structured interviews which were corroborated against each other. In addition, the data collection techniques used for the model testing phase were direct observations, semi- interviews and documents which were corroborated against each other. This provided this research with various

advantages: 1) It assisted in creating analysis with richer details and encouraged the emergence of new innovative viewpoints (Miles, Huberman 1994). 2) It provided this research inquiry with stronger substantiation of constructs and hypotheses (Eisenhardt 1989). 3) It also helped in establishing a chain of evidence (Yin 2003). 4) It enhanced the construct validity of this research (Yin 2003).

Another form of triangulation which was used while populating the improved version of the model that was tested using the Rolls Royce case study, was the triangulation of mixed methods. Triangulation of mixed methods relates to simultaneous use of quantitative and qualitative data within the study (Creswell, Plano Clark 2006). Table (6.6) in Chapter 6 illustrates how this type of triangulation was used during testing the model. The advantages of using this form of triangulation are summarised based on the work of various authors on the subject (Tashakkori, Teddlie 1998, Creswell, Plano Clark 2006, Modell 2009):

1) It improves the accuracy of the study by giving evidence from other methods.

2) Combining the best of both qualitative and quantitative methods negates the weaknesses of one method through the strengths of the other.

3) It assists the development of new methods in tackling problems and uncovering the deviant dimension of a phenomenon.

4) It utilises qualitative and quantitative methods while allowing them to complement each other.

Threats to the validity of this research project, which were related to the investigation of a small sample of offices, were minimised by the use of two tactics:

1) The selection strategy of case studies that was adopted in the pilot study phase aimed to fill organic and mechanistic theoretical categories while giving examples of polar kinds (Eisenhardt 1989, Miles, Huberman 1994). This is a form of the extreme case sampling technique (Creswell 2004, Patton 2002). Consequently, two pilot studies of two offices were selected in this study. The first case exhibited

predominantly organic characteristics whereas the second case exhibited predominantly mechanistic characteristics. This was done because mechanistic and organic structures are opposite to each other as advocated by Robey and Sales (1994) and Courtright, Fairhurst et al. (1989) and these structures have received a great deal of attention by many authors such as Mullins (2007), McKenna (2006), Robey and Sales (1994), Burns and Stalker (1961), Huczynski and Buchanan (2007) and Magnusen (1977). These authors agreed that any organisational unit fits within a quantum of a mechanistic system in one end and an organic system in the other. However, Magnusen states that there are no pure mechanistic or organic offices, there is always a mix between both (Robey 1991). This raised the issue of investigating which part of the office is mechanistic and which part is organic. An initial attempt was made when selecting a mechanistic or organic office to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991). Magnusen advocates that a research office has the least percentage of mechanistic tasks (i.e. up to 7% percent mechanistic tasks). Based on this, it was considered that selecting a research office for the first case study would be representative of offices which exhibit predominantly organic characteristics. On the other hand, Magnusen advocates that a finance office tends to have the highest percentage of mechanistic tasks and the least percentage of organic tasks (i.e. up to 36% organic tasks) (Robey 1991). Based on this, it was considered that selecting a finance office would be representative of offices which exhibit predominantly mechanistic characteristics. In addition, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office was interviewed to indicate what part of the office was organic and what part was mechanistic. This is further explained in section 3.2.6.

2) The selection strategy adopted in the model testing phase aimed to fill the theoretical category of two offices predominantly exhibiting organic characteristics (i.e. an extreme situation) (Pettigrew 1990, Huberman, Miles 2002). This is a form of the extreme case sampling technique (Creswell 2004, Patton 2002), which provided transparently observable phenomena of interest (Pettigrew 1990, Huberman, Miles 2002). Consequently, the case studies

exhibiting predominantly organic characteristics were selected to fill a theoretical category of an office that represents an extreme situation as advocated by Mullins (2007), McKenna (2006), Robey and Sales (1994), Burns and Stalker (1961), Huczynski and Buchanan (2007) and Magnusen (1977). This choice was found to be congruent with the aim of this study as advocated by Rowley (2002), which was related to testing the new generation of value stream mapping. Also, this choice allowed the use of literal replication logic in order to find out if testing the model using two cases exhibiting similar organic characteristics would produce replicated results or not. If the case studies produce replicated results, it means that they supported the model of this study as advocated by Yin (2003).

7.5   Recommendations for Improvements

The recommendations of the managers of the Rolls Royce and Siemens offices, which were related to the model and its findings, were cross checked with each other to reduce bias. These recommendations are presented in a tabular format as shown in Tables (7.8 & 7.9).

Table (7.8) shows a summary of the recommendation to the model stated directly by the manager of each case study. The summary of the indirect recommendations are presented in the table below in **bold** text for each of the managers' quotations.

	DIRECT RECOMMENDATIONS – SIEMENS MANAGER *	DIRECT RECOMMENDATIONS – ROLLS ROYCE MANAGER *
	"Simplicity… Making it easier sort of wording… Its academic sort of thing… some of that wording probably needs a dictionary to understand…	*"The terms are very easy to understand…"*
1	**Summary of recommendations concluded from combined opinions of managers:** **In the Siemens case study various academic terms were explained to the manager as they were used to describe the new design recommendations which were found to be challenging and complex to be understood by the manager. However, because this was criticised, an attempt was made in the Rolls Royce case study to use simpler terms, which was successful as the manager perceived them to be easy to understand.**	

	DIRECT RECOMMENDATIONS – SIEMENS MANAGER *	DIRECT RECOMMENDATIONS – ROLLS ROYCE MANAGER *
2	*"… Because both talk about how much support you are giving to the employees, you can probably cut some of these down (i.e. pointing his finger at the employee variable of the employees' support management system) to those (i.e. pointing his finger at the leadership style and organisational culture management systems…)... Just do not lose some of these (i.e. pointing at the employees' support management system and its variables) if there is not a big divide… for instance, if there is a big divide between let's say the history of the office… okay.. and you cannot fit it in there (i.e. pointing at the leadership style and organisational culture management systems)… and it's important to your process, the history of the office, make sure it is captured"*	The manager agreed and recommended that Task Uncertainty should be excluded from the Choice of Work Unit Planning office management system, because it is already considered within the Value Stream Mapping tool and the Thompson's (1967) Interdependence. He states: *"Yah, it is repeated… it is duplication that… so you can take it out…"*
	Summary of recommendations concluded from combined opinions of managers: **From this it is recommended that variables that were perceived as duplicated should be excluded from the model.**	
3	*"… Training is important, because that is quite in depth…"*	*… Improvements is training, how do you put this in a training package to help managers understand how to do this… because you are assuming they are not gonna know what a VSM is and everything…etc… you need to show them what these things are…*
	Summary of recommendations concluded from combined opinions of managers: **It is recommended that the one of the essential factors related to the success of the implementation of this methodology of implementation is to train the manager and the employees of the office and provide them with guiding steps.**	
4	*"Why shall we use it over other used tools… why shall we use this tool and not another tool, if I want to redesign the office, I am the manager, I make the decision, what are the benefits…"*	*"I think that a selling point for this tool is to explain that it can help the managers understand how to make the office and organisation lean and we are all under pressure to do that… time, efficiency, savings etc… You know the lean organisation… So the main selling point is to look at your total processes and how you can improve them using this model"*
	Summary of recommendations concluded from combined opinions of managers: **It is recommended from both managers that the tool must be able to sell itself by convincing managers to use it. This can be done by explaining the benefits of the tool in terms of making the office leaner, more effective and improving the processes.**	
5	*"Anything that is common in the stages of the model, you can put it in one, otherwise, you are duplicating…"*	*"You need to combine any duplication in any of the stages of the model… like stages 10 and 11... It is duplication that… so you can take stage 11 out…"*

	DIRECT RECOMMENDATIONS – SIEMENS MANAGER *	DIRECT RECOMMENDATIONS – ROLLS ROYCE MANAGER *
	Summary of recommendations concluded from combined opinions of managers: **Stages 10 and 11 of the model shown in Figure (6.14) in Chapter 6 were merged into one stage as shown in Figure (7.1), because both managers agreed that duplications should be eliminated. Stage 10 was about identifying whether a task activity is mechanistic or organic. Then stage 11 was about classifying those tasks in terms of mechanistic and organic. It was considered better to combine the stages**	
6		*"You need to do risk assessment against each one (i.e. office management systems) as well, because the tool talks about how to do it and you should be doing it this way… prescriptive… but there is no way I can see where you have to capture the risks to look at consequences if things go wrong and they do go wrong"*
	Summary of recommendations concluded from combined opinions of managers: **Stage 24 is going to be added to the model as shown in Figure (7.1). It is called Risk Assessment for implementation of new design recommendations for each of the management systems**	

(*) Direct recommendations are ones that are suggested directly by the manager of each case study.

Table (7.9) shows a summary of the recommendation to the model indicated indirectly by the manager of each case study. The summary of the indirect recommendations are presented in the table below in **bold** text for each of the managers' quotations.

	INDIRECT RECOMMENDATIONS – SIEMENS MANAGER *	INDIRECT RECOMMENDATIONS – ROLLS ROYCE MANAGER *
1	The manager criticised the detailed step by step flow chart of the methodology of implementation by stating: *"There is no sort of defined difference between stages of current state and future state…"*	The manager states that one of the strengths of the tool as follows: *"Again, you broken it down into chunks, because if you are trying doing it from scratch, there is so much you gonna miss out, but here you've broken it down and done step by step… you know how to think it"*
	Summary of Recommendations concluded from combined opinions of managers: **This is why it is recommended to explain the current state phase and future state phase within the top up form of the model. In addition, the version of the model showing the detailed steps could state in a little paragraph, which stages are related to the current or future states of the office.**	

	INDIRECT RECOMMENDATIONS – SIEMENS MANAGER *	INDIRECT RECOMMENDATIONS – ROLLS ROYCE MANAGER *
2	*I have been forty three years in business, I worked with a lot of people, there is cultural resistance, how much and why should I use it… my time is money…. Business way…*	*"it's the mindset and culture change… to adopt this way of thinking"* *"if people do not want to do it! For example, the way you do it you can use communication, you get them involved and we wanna do this… what do you guys think! Make it look like it came from them, even though you know what the answer is, so that they engage from there…*
	Summary of Recommendations concluded from combined opinions of managers: **Since both managers agree that there is cultural resistance when it comes to change, it is recommended to reason with those employees who are resisting the use of the tool by communicating to them, getting them involved and make them think that it actually came from them until they get engaged.**	

(*) indirect recommendations, which are suggested indirectly by the manager of each case study, are deduced from manager's constructive feedback.

7.6 Statement of the Final Model

The final version of the model is shown in Figure (7.1). A final version of the mind map, which represents the final management systems of the office and their subcomponents, is also shown in Figure (7.2).

Figure (7.1) illustrates the final version of the model. The modified stages are presented below in red colour.

Variables (A-1): variables identified initially from the office current state to initiate the process (e.g. organisational culture, heterogeneity, stakeholder' expectations, skill set, financial restrictions, constraints of office layout and structure)	**STAGE 1**
Identify the level of task complexity	**STAGE 2**
Identify the No. of workers needed to populate the various stages of model based on the task complexity level	**STAGE 3**
Variables (A-2): Identify variables initially from the office current state (e.g. leadership style, organisational effectiveness & business strategy) – Team event	**STAGE 4**
Identify all the task activities of the office – Team event	**STAGE 5**
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively	**STAGE 6**
Evaluate the perceived uncertainty of each task activity	**STAGE 7**
Evaluate the perceived task analysability of each task activity	**STAGE 8**
The effect of evaluating levels of task uncertainty & task analysability by relying on the subjective opinion of the manager is reduced by evaluating each based on the opinions of a group of respondents – Team Event	**STAGE 9**
Identify & divide each type of each task activity of the office in terms of mechanistic or organic – Team event	**STAGE 10**
Divide each task activity in terms of risk level, this may include: 1) High risk mechanistic task activities. 2) Low risk mechanistic task activities. 3) High risk organic task activities. 4) Low risk organic task activities – Team event	**STAGE 11**
Group each task activity in terms of two system designs: 1)Mechanistic flow system design for low risk mechanistic tasks & high risk organic tasks. 2) Organic system design for high risk mechanistic tasks & low risk organic tasks	**STAGE 12**
Variables (B): variables identified the characteristics of the method used to produce the output of each task activity such as technology & interdependence. They are identified for each task activity of each system design – Team event	**STAGE 13**

For task activities of mechanistic flow system design | *For task activities of organic system design*

Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event	**STAGE 14**		**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**
Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set	**STAGE 15**		**Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set – each value stream map is labelled with both weak or strong & any stakeholders' expectations**
Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	**STAGE 16**		**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**
Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event	**STAGE 17**		**Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event**
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	**STAGE 18**		**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**
Define characteristics of the independent variables (A-1 & A-2) needed to develop the office future state (Note: Evaluating variables (A-2) requires a team event)	**STAGE 19**		**Define future state characteristics of the independent variables (A-1 & A-2) - Evaluating variables (A-2) requires a team event**
Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event	**STAGE 20**		**Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event**
Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14	**STAGE 21**		**Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14**
Prepare a table listing design recommendations for the office manager in terms of the office seven systems	**STAGE 22**		**Prepare a table listing design recommendations for the office manager in terms of the office seven systems**
Continuous Improvements – Draw future Value Stream Maps as needed	**STAGE 23**		**Continuous Improvements – Draw future Value Stream Maps as needed**
Risk Assessment for implementation of new design recommendations for each management system	**STAGE 24**		**Risk Assessment for implementation of new design recommendations for each management system**

Figure (7.2) illustrates a final version of the management systems of offices and its various components.

7.7   <u>Discussion</u>

The conceptual model, which was formed from a combination of literature review and pilot studies, was further tested using a multiple case study design and action research, as shown in Chapter 7. This resulted in an improved version of the model. This improved version of the model was validated in this chapter. The limited validation studies have indicated a final statement of the model, which is shown in Figure (7.1). The limited validity of this research was carried out for two small organic consulting type offices. This makes this study generalisable for consulting type of offices that are small in size. Hopefully, this work is valid for other office types but it needs to be further investigated and proven. This limited validity puts a case for future work. This opportunity for future work is further explained within section 9.5.

The final statement of the model presented in Figure (7.1) meant that the answers to research questions two and three were validated and confirmed. Research question three was answered by developing a methodology of implementation for redesigning or diagnosing the management systems of offices. Research question four was answered by developing a new generation of value stream mapping which can be used to map organic task activities that tend to be uncertain, unanalysable and complex.

Various limitations were expected to have arisen whilst validating the model using the subjective opinion of each manager. Various preventive measures were taken to counteract the effect of these limitations. These are explained below:

1) Limitations due to the fact that each manager might be busy and may not be willing to answer the questions properly or thoroughly. I could not find evidence of this limitation because managers were very generous with their time and were very enthusiastic about answering the questions. Nonetheless, every measure was taken to counteract the possibility of this limitation such as: 1) It was attempted to book the interviews for each of the offices at a time that was convenient to each manager. 2) The seriousness of the work was explained to the manager of each office by stating that the work is part of an award for a PhD

degree. 3) The managers were informed that it was indented to publish this research work along with their opinions about the tool in a reputable academic journal.

2) Limitations due to the reactive effects and the Hawthorne effect. The reactive effects are factors that constrain the ability of the researcher to generalise beyond the experimental settings (Bryman 1989) due to the presence of the researcher while validating the model (Bryman 1989). The Hawthorne effect refers to the inclination of some individuals to work harder and perform better when they are participants in a research or experiment (Bryman 1989). This is because people may alter their behaviour due to the attention they get from researchers rather than because of any manipulation of independent variables (Bryman 1989). The 'demand characteristics' is another form of reactive effect of the experimental situation, which implies that participants often adjust their behaviour in order to support the hypothesis around which the experiment is tailored (Orne 1961). An attempt was made to be aware of these limitations while carrying out the interviews. However, the evidence of these limitations could not be found because the managers seemed candid and were very willing to be critical.

3) Although the manager of each office had a great deal of experience in restructuring offices throughout the whole of the organisation and were highly experienced in the operations of their offices, it was considered that there may be limitations related to their lack of knowledge and/or bias in validating the model and its findings. An attempt was made to reduce the manager's bias by stating the importance of their constructive criticism. In addition, it was attempted to cross check the feedback of one manager with another during the interviews by asking the manager of issues that were raised by the other. This helped in cross checking the opinions of the Siemens manager against the opinions of the Rolls Royce manager.

Although the opinions of the two managers managed to provide various recommendations to the model as shown in section 7.5, the limitations of using this

approach to validate the model have been accepted. The recommendations of the managers were considered to add value to the model for the following reasons: 1) The manager of each office were closely involved in the development and testing of the model which enabled them to better understand the tool and provide accurate opinions. 2) The managers were considered to be in a good position to judge the results of the model (i.e. new design recommendations of the office), because they were highly experienced in the operations of their offices. 3) The employees were only involved in issues related to the development and testing of the new generation of value stream mapping rather than the actual testing of the whole tool. Although the limitations of using the opinions of the managers of each office to validate the model were accepted, it is still considered that the adopted validation approach put a case for future work due to the following limitations: A) Limited sample of respondents used to validate the model. B) The bias and lack of knowledge of the two managers who validated the model. It is therefore recommended to examine new ways for carrying out the validation using different approaches such as quantitative methods. This could be done by involving future researchers on a participant basis in a longitudinal study of an office that is needed to be redesigned. The aim would be to quantitatively validate the model in the light of the findings of the methodology of implementation (i.e. new design recommendations). This validation can be carried out using a higher sample of respondents.

7.8   **Summary**

This chapter showed how the model derived from the testing phase of Chapter 6, was further validated. This validation was carried out in terms of two perspectives, industrial and academic. The focus of the industrial perspective was on validating the usefulness of the model findings which were in the form of new design recommendations for each of the offices used to test the model. An attempt was also made to validate the novelty of the tool from an industrial perspective. Furthermore, other issues related to the model, its implementation methodology and management systems were also validated. Qualitative research was used to carry out this industrial validation by asking an expert who was the manager of the office that provided opportunity to populate the model during its testing phase. The various

recommendations of the managers of each case study were carried out and presented. In parallel, the model was validated academically to show how this research was academically viable. This was done by discussing convincing issues which were related to the academic viability of this research inquiry. The potential issues that would make the work invalid were also discussed. This was followed by a statement of the final model. At the end, a discussion of the approach used in this limited validity study was presented.

The next chapter presents a discussion about this project. It starts by stating the initial aims of this study, then how the revised set of objectives of this research inquiry were answered. A discussion about the achievement of these research objectives is also presented. The contribution to knowledge is also listed. The limitations of the adopted methodology in this research project are discussed. The strengths and weakness of the model of this study are also presented.

8 *CHAPTER EIGHT: Discussion*

8.1 Introduction

The literature review was conducted in the fields of offices, office management systems, organisational design, lean offices and office value stream mapping, organisational behaviour and psychology, organisational dynamics etc. It uncovered paucity in the current literature about redesigning offices and their management systems to make them become leaner and more effective. In the light of this paucity, the completed work focused on studying variables, organisational models and concepts which can be integrated within one tool. This tool can be used by the manager to help them redesign their office and its various management systems.

This chapter discusses how the work was conducted, it also elaborates on how the revised research objectives were met and provided clear answers for the research questions of this research inquiry. A discussion about the methodology adopted to achieve each of these research objectives is also presented. It also discusses the reasons behind developing the model. The value of the model is discussed for practitioners and academics. The theoretical contribution added to knowledge by this research inquiry is also presented as well as the limitations of the adopted methodology in this research. Moreover, various limitations and strengths of the model are outlined.

8.2 Achievement of Research Objectives and Discussion

The methodology adopted to achieve each of the revised objectives of this research is presented below. A discussion about the methodology used to meet these revised objectives is also presented. These are presented below:

- **OBJECTIVE 1:** To identify variables and concepts that can be used to understand, characterise or redesign offices and their management systems.

An extensive review of various areas of literature (e.g. organisational theory and design, organisational dynamics, organisational behaviour and psychology, lean offices etc) was carried out to identify a list of variables which can be used to characterise, understand or redesign offices and their management systems. These variables include task uncertainty, task complexity, task analysability, risk, interdependence, organic or mechanistic structures etc. Two pilot studies of opposite (i.e. polar) types of offices were used as an attempt to test the literature review findings. This test was done by identifying any emerging basic themes from the answers of the various respondents. Five new variables emerged from this empirical thematic analysis which included manor of working, task steps nature, task sequence, feedback driven and simultaneous tasks. These variables were found to be indirectly discussed by various authors on the subject (Robey 1991, Robey, Sales 1994, Huczynski, Buchanan 2007) as they were describing various types of Thompson's (1967) interdependences and technologies. Since the adopted methodology to answer objectives 1 & 2 had much in common, the discussion about how these objectives were met is presented together in section 8.2.1.

- **OBJECTIVE 2:** To identify the main office management systems that can be used to redesign offices.

Since, an office can be considered a small organisation (Galbraith, Downey et al. 2002). The management systems used as design components within three well-established organisational design models (e.g. VSM, McKinsey 7-S Model and Galbraith Star Model) were explored. In parallel, the management systems which emerged as a result of the analysis of the pilot studies phase were compared with the ones used in rival theories as advocated by Yin (2003). This comparison aimed to inspect if the results of the pilot studies were representative of offices. It was done by using the constituent systems of the VSM, Galbraith Star Model and McKinsey 7-S as a check of the subsystems of the office to determine if they were present as shown in Table (4.2) in Chapter 4.This shows how the management systems of offices were identified to represent the redesign or diagnosis of offices. These management systems are organising activities / actors, leadership style, technology

characteristics, organisational culture characteristics, work unit planning, assessing individuals and employees' support. A discussion about how objectives 1 and 2 were met is shown below:

8.2.1   Discussion on the Methodology Adopted to Achieve Objectives 1 & 2

I think I have captured most of the management systems used to represent the design components of offices. I also believe that most of the variables needed to help the manager better understand and analyse offices have been captured. In addition, when the pilot studies were chosen to test and complement the findings of the literature review, there was a case for extending the pilot studies to also examine offices in service sectors and a wider range of office types. This is a subject for some further research. The selection strategy adopted in this pilot study phase aimed to fill the theoretical category (i.e. organic and mechanistic systems while give examples of polar kinds (Eisenhardt 1989, Miles, Huberman 1994), which is a form of the extreme case sampling technique (Creswell 2004, Patton 2002). Consequently, two pilot studies of two offices were selected in this study. The first case exhibited predominantly organic characteristics whereas the second case exhibited predominantly mechanistic characteristics. Magnusen states that there are no pure mechanistic or organic, there is always a mix between both (Robey 1991, Mullins 2007). This raised the issue of investigating which part of the office is mechanistic and which part is organic. An initial attempt was made when selecting a mechanistic or organic office to rely on the perceived nature of the office by following the work of Magnusen (Robey 1991, Mullins 2007). Magnusen advocates that a research office has the least percentage of mechanistic tasks (i.e. up to 7% percent mechanistic tasks). Based on this, it was considered that selecting a research office for the first case study is representative of offices which exhibits predominantly organic characteristics. On the other hand, Magnusen advocates that a finance office tends to have the highest percentage of mechanistic tasks and the least percentage of organic tasks (i.e. up to 36% organic tasks) (Robey 1991). Based on this, it was considered that selecting a finance office is representative of offices which exhibit predominantly mechanistic characteristics. In addition, in order to cope with the fact that offices are a mix of organic and mechanistic tasks, the manager of each office

was interviewed to indicate what part is organic and what part is mechanistic. As a result the manager of the finance office indicated that the office is mainly mechanistic (i.e. 85%-90% mechanistic) whereas the supervisor of the organic office pointed out that 95% of the tasks of the office are organic tasks. Therefore, various strategies had to be developed to cope with this while interviewing various respondents during the model testing phase. This is further explained in section 3.2.6.

During the verification of the various themes within the pilot study phase of this research, the number of respondents used to gather information was considered adequate when the opinions and views emerging were showing consistent patterns and no new information had emerged by interviewing extra people. In addition, two initial interviews were carried out at the beginning, with the manager of each office, to determine the appropriate number of people required to be interviewed. This was done by gaining understanding of the nature and variations of the task activities of the office. These interviews were guided using an interview protocol shown in Appendix (H).

- **OBJECTIVE 3:** To explore various organisational models, suitable for representing management systems of the office such as leadership and organisational culture, and identify their limitations.

An extensive literature review of various leadership and organisational models were reviewed. The literature indicated the suitability of using the Competing Values Framework to represent the organisational culture of an office. In addition, the literature suggested the suitability of situational leadership to represent the leadership adopted within an office. An attempt was made to identify the components of each one of these models within the basic themes of the pilot study phase. It was found that the components of these models were described by the respondents of each office to explain each management system related to them. For instance, dimensions of situational leadership such as leader / follower relationship behaviour, leader / follower task behaviour and follower readiness emerged as basic themes in the pilot studies findings as shown in Table (3.8). In addition, dimensions of the

Competing Values Framework such as flexible / focused and internal / external emerged as the basic themes of the pilot study's findings as shown in Table (3.8).

- •**OBJECTIVE 4:** To explore and attempt to justify any limitations of the conventional form of value stream mapping in office domains and the services sector.

A thorough review of the literature indicated how the use of the conventional form of value stream mapping has been limited to certain office types/parts. This was evident in various case studies of various authors on the subject (Tapping, Shuker 2003, Keyte, Locher 2004) which were reviewed and critiqued. The findings of this critique indicated how the conventional form of value stream mapping has been limited to mechanistic task activities which tend to be predictable, analysable and simple. The findings also uncovered limitations in applying this conventional form in organic task activities which tend to be unpredictable, unanalysable and complex. This indicated that modifications needed to be carried out to the standard form of value stream mapping to enable the tool to map organic task activities that are unpredictable, unanalysable and complex. In parallel, this limitation was also confirmed during the action research of the two investigated case studies of offices which predominantly exhibited organic characteristics. In one of the case studies (i.e. Rolls Royce), the conventional form of value stream mapping was drawn successfully for the mechanistic task activity of the office only, however the rest of the organic task activities could not be drawn. Since the adopted methodology to answer objectives 4 & 5 had much in common, the discussion about how these objectives were met is presented together in section 8.2.3.

- •**OBJECTIVE 5:** To identify a new generation of value stream mapping that is suitable for office domains and can map uncertain, complex and unanalysable organic task activities.

The literature was explored to identify ideas from other mapping techniques and concepts that may be used to map organic task activities in office domains. A new generation of value stream mapping was mainly deduced from the Lean

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Consumption Map which was invented by Womack and Jones (2005) to streamline a company's consuming processes. It was found suitable because it breaks down the task activity in terms of a provider and a consumer interaction which provides an opportunity to explain and present the interactions in greater depth. In addition, the black box concept was considered to be suitable for mapping any unanalysable or complex tasks within the organic task activity. Other creative graphical modifications arising from this research were also added. This resulted in having a new generation of value stream mapping tools to map organic task activities. It was further tested by utilising an action research strategy. An example of this new generation of value stream mapping is shown in sections 6.2.4 and 6.3.4 in Chapter 6. A discussion about how objectives 4 & 5 were met is presented below:

8.2.2   Discussion on the Methodology Adopted to Achieve Objectives 4 & 5

Two in-depth case studies were chosen to test the model as well as the use of a mix of Value Stream Mapping tools. This mix involved the use of a conventional version of Value Stream Mapping to map mechanistic task activities along with the use of the new generation of Value Stream Mapping to map organic task activities. This multiple case study design focused on testing the new generation of Value Stream Mapping using two case studies which enabled the utilisation of replication logic. The two case studies selected exhibited predominantly organic characteristics. As a result, one mechanistic value stream map and six organic value stream maps were drawn successfully for both offices as shown in sections 6.2.4 and 6.3.4 in Chapter 6. The selection strategy adopted in the model testing phase aimed to fill the theoretical category (i.e. organic systems) and select cases of an extreme situation (Pettigrew 1990, Huberman, Miles 2002). Consequently, two case study offices that exhibit predominantly organic characteristics were selected as many authors agree that any organisational unit fits within a quantum of a mechanistic system in one end and an organic system in the other (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007, Magnusen 1977).

Action research was used as a research strategy along with multiple case study design to test the new generation of value stream mapping. The implementation of

action research is criticised by Bryman in terms of its difficulties in avoiding manipulation due to the exclusion of lower level workers (Bryman 1989). Consequently, this study included lower level employees during action research. Because this would also be congruent with the requirements of drawing the value stream maps by a team of the employees involved in the process as advocated by Tapping and Shuker (2003) and Keyte and Locher (2004).

Another criticism of action research is related to the possibility that an organisation will not implement the researcher's solution if they were perceived critical of the organisation (Bryman 1989). A cautious approach was taken to handle any potential refusal of employees in implementing results in this action research by adopting action research with distinct foci on process consultation advocated by Schein (1999). The adoption of foci on process consultation in this research focused on assisting the sponsor (i.e. research site employees) to gain the skills of diagnosis as well as fix organisational problems to allow them to develop the autonomy in improving their organisation (Schein 1999). Little evidence was found with regards to this limitation because the employees and the manager of the office were willing to fully collaborate. In order to save the time of the busy employees, the employees were advised to draw the future state maps of the office on their own. This was done for the following reasons: 1) The latter stages of the model did not depend on the results of the future state value stream maps. 2) The employees confirmed that they had good experience in drawing future state value stream maps. 3) The employees managed to draw the Value Stream Maps of the office autonomously.

- **OBJECTIVE 6:** To develop a methodology of implementation in the form of a set of guidelines for redesigning or diagnosing offices and their management systems and to add to the existing theory on the role of Viable System Model in office domains.

An extensive review of the literature was carried out to identify causal relationships between various variables (e.g. task uncertainty, task complexity, task analysability, risk etc) and office management systems (e.g. leadership style, organising employees/actors etc). These variables and office management systems were

identified based on cited literature and findings of the pilot case studies. They were also used along with some formulated theoretical assumptions to create the conceptual model of this study in the form of a step by step methodology of implementation to redesign offices with a focus on their management aspects. This conceptual model was further tested and refined using a multiple case study design. The strategy used to choose these case studies was discussed in section 8.2.3. Then the model was validated by asking the subjective opinion of the manager of each office contributing to the cases of this research. A final answer for this objective was presented in Figure (7.1) in Chapter 7 in the form of a methodology of implementation.

A discussion about how this objective was met is presented below:

8.2.3 Discussion on the Methodology Adopted to Achieve Objective 6

As far as the model testing phase is concerned, it is worthwhile to note that the model was tested using the first case study (i.e. Siemens' office). The research method used to populate the model were pure qualitative. The limitations of the pure qualitative research method adopted in the model were accepted while testing the model using the first case study. However, it was concluded that the research method adopted to populate the model could be improved by using mixed methods research rather than pure qualitative research as advocated by Bryman and Bell (2007). This involved the use of the Semantic Differential Scale as a data collection technique which could be gathered and analysed qualitatively or quantitatively. An attempt was made to measure the semantic differential scale quantitatively unless the nature of semantic terms was not quantifiable (Harasym, Boersma et al. 1971). While analysing the scales, every effort was made to maximise the use of the quantitative aspect of the analysis (i.e. using percentages or statistical calculations). This was considered to be an added advantage for using them in this research. This advantage was related to the fact that their analysis can become more objective if used quantitatively. For instance, quantitative averages were only calculated to analyse a group of semantic differential scales which aimed to evaluate variables consisting of various components (e.g. task uncertainty). However, this was not done

during the evaluation of the other variables measured using one scale because one respondent was used to answer the scale. On other hand, if the variable evaluated using the semantic differential scale was not quantifiable (i.e. has a qualitative nature), it was analysed qualitatively. This qualitative analysis of the semantic differential scales was carried out using two analytical conditions as shown in the interview protocol of the Rolls Royce case study in Appendix (J). While developing these two conditions needed to analyse each pure qualitative scale, every effort was made to maximise the use of cited literature.

It is worthwhile to note that the new design recommendations of each of the offices of the case studies shown in sections 6.2.5 and 6.3.5 were presented to the manager of each office for them to implement. Although the managers opinions managed to provide various recommendations to the model as shown in section 7.5, the limitations of this approach in validating the model has been accepted. It is still considered that the adopted validation approach put a case for future work due to the following limitations: A) Limited sample of respondents used. B) The bias and lack of knowledge of the two managers who validated the model. This puts a case for future work as shown in section 9.5.

8.3   <u>Why Develop the Model</u>

The literature review indicated how most researchers, who are interested in office design, have been focusing on the ergonomics and the physical layout of offices. Very little attention was found in developing the organisational and management side of offices. Most recent work related to developing offices was merely limited to lean offices and the application of various lean tools and techniques such as 5S, Kaizen and Value Stream Mapping within office domains. However, the implementation of various lean tools and techniques has been facing many challenges and limitations. The critical review of the literature strongly suggested how the lack of understanding of the literature about offices was a main reason for these limitations and challenges. This prompted an opportunity to develop a methodology of implementation for redesigning or diagnosing offices to make them become leaner and more effective. This tool has been equipped with various techniques, variables and models that can

help the analyst in better understanding and analysing offices. For instance, this tool incorporates the VSM and Value Stream Mapping within it.

8.4   Model Value

The findings of this research inquiry provided some prominent insights and value to academics and industrial practitioners. The first insight is related to the fact that a set of variables and tools were identified to help in the better understanding, characterising and analysis of offices as shown in Tables (3.8 and 3.9). While most researchers in the area of offices focused on the physical design and the ergonomics of offices, this might be due to the fact that senior managers of offices focus on the physical aspects of the office and give little attention to the wider change-management issues (Turner, Myerson 1998). Emiliani (2007a) argues that most researchers in this domain such as Piercy, Rich (2009), Thompson (1997), Tapping, Shuker (2003), Moad (2008), Emiliani (2007b), Thompson (2000), Keyte, Locher (2004), Tischler (2006), Huls (2005), Duggan (2007), Lareau (2003) and Keyte (2004) seem to focus on applying lean tools and techniques in office domains, while giving very little attention to improving the overall organisational design of offices as they do usually fail in implementing a full lean strategy for the office (Emiliani 2007a). This failure might be due to the fact that certain lean techniques such as value stream mapping are proven more difficult or less relevant in non-production areas as advocated by Moad (2008). In addition the literature review indicated that the majority of researchers such as Mullins (2007), Galbraith, Downey et al. (2002), Duncan (1981), McKenna (2006), Robey, Sales (1994), Beer (1985), Waterman, Peters et al. (1980), Miller, Friesen (1984), Thompson (1967), Huczynski, Buchanan (2007), Moorhead, Griffin (2004) and Kotter (1978) have been focusing on variables, tools or concepts that can be used to characterise organisations and their design rather than offices. All of these authors written literature in various business and management disciplines (e.g. organisational theory and design, organisational behaviour, organisational psychology and organisational dynamics etc). This focus on organisations rather than offices might be related to the fact that offices can be considered as small organisations (Galbraith, Downey et al. 2002).

The second insight is related to showing how both the Competing Values Framework and the situational leadership were used to represent two of the office management systems (i.e. organisational culture characteristics and leadership style respectively). Insights regarding the implementation and evaluation of each of the two models within office domains were provided within the model. Much attention has been given by researchers (Cameron, Quinn 1999, Cameron 2009) to the advantages of using the Competing Values Framework. In addition, much attention has been given by researchers to the advantages of using situational leadership (Mullins 2007, Huczynski, Buchanan 2007, Hersey, Blanchard et al. 2008). However, little attention has been paid to how each of these models can be practically applied within office domains. This model shows how these models can be practically applied to provide value to offices and add new dimensions to better understand their organisational culture and leadership characteristics.

The third insight is related to developing the model of this study in the form of a methodology of implementation (i.e. step by step set of guidelines for redesigning or diagnosing offices and their management systems by managers). The review of the literature identified an opportunity for developing this tool for the redesign of office management systems which takes into account the following considerations: 1) The utilisation of various management organisational variables and models which can help in the better understanding, characterising and analysis of offices. These variables and models (e.g. task uncertainty, task complexity, task analysability, weak or powerful, mechanistic/organic, interdependence, coordination, Competing Values Framework, situational leadership… etc.) were creatively inferred from other research contexts. 2) The redesign of an office in terms of seven management systems that represent the various design components of the office. 3) The adoption of Magnusen's research while redesigning an office which considers that offices are a mix of organic and mechanistic tasks. 4) Since offices are redesigned in this tool in terms of a mix of organic and mechanistic tasks, the impact of the risk level on the nature of the organic and mechanistic tasks of the office is considered within the steps of the model, based on the work of Robey (1991) and Lin (2006). 5) The utilisation of both a new generation of value stream mapping that can be used to

map organic tasks along with the conventional form of value stream mapping that can be used to map mechanistic tasks. 6) The introduction of continuous improvements to the model by providing an opportunity to the ongoing use of Value Stream Mapping within the model (Keyte, Locher 2004), because the future state map can be utilised to develop lean improvement strategies such as flexibility through multi-skilling workers and parallel working (i.e. reducing cost) (Tashakkori, Teddlie 2003). In addition, Pepper and Spedding (2010) argue that Value Stream Mapping needs to be methodically applied before other tools such as 5S to achieve a truly lean operation which provides the opportunity to implement a lean system. 7) The use of the VSM within the model as a framework for diagnosing the office was done in two ways. The first was by introducing a novel implementation of the VSM in office domains. The second was by using the five constituent systems of the VSM as a check of the subsystems of the office (i.e. that are used within the model of this study) to determine if they are present and if they are operating effectively.

Another value of the model, which is concerned with the limitations in applying the conventional form of value stream mapping in various parts or types of offices, was provided by proposing a new form of value stream mapping. This enabled the utilisation of continuous improvements to all office types/parts, without being limited to the mechanistic task activities. This study was enabled through the utilisation of Values Stream Mapping throughout the office because Value Stream Mapping is considered to be a catalyst that can help the employees to create change. This is due to the fact that Value Stream Mapping is one of the most significant lean tools and techniques which can provide the opportunity to implement a lean system (Pepper, Spedding 2010).

8.5 <u>Theoretical Contribution</u>

The work shown in this thesis contributes substantially to knowledge and theory about offices and the redesign of their management systems to make them run in a leaner and more effective way, as shown below:

1. While most researchers in the area of office design focus on ergonomics and physical layout principles, this research provided guidelines to the managers of offices that allow them to redesign/diagnose their office to make them more effective and leaner. This design tool incorporates seven original office management systems (e.g. organising activities / actors, leadership style, technology characteristics, organisational culture characteristics, work unit planning, assessing individuals' and employees' support), and a set of variables (e.g. task uncertainty, interdependence, task complexity, mechanistic or organic, risk, task analysability etc.), which helps the manager better understand offices and their management systems.

2. Very little attention has been given to redesigning offices while considering a realistic mix of organic and mechanistic tasks as advocated by the research of Magnusen which was presented by Robey (1991) and Mullins (2007). This study builds on the work of Magnusen (Robey 1991, Mullins 2007) and Burns and Stalker (1961) by proposing a methodology of implementation which introduces a novel approach for redesigning offices while coping with this realistic mix of organic and mechanistic tasks that exists in most offices. This is done by redesigning the office in terms of the mechanistic or organic nature of each of its task activities.

3. This research builds on the work of Robey (1991) and Lin (2006), which is related to identifying the implication of risk on the mechanistic and organic task activities. Because, little attention has been given to show the implications of risk level on the design of the task activities of an office within a comprehensive tool. This design tool adds a new dimension to office design by introducing a new approach which considers the impact of the risk level inherent within the task on the design of the mechanistic or organic task activities. The final version of the model shown in Figure (7.1) in section 7.6 illustrates how the office task activities are classified into four types of task activities (e.g. mechanistic with high risk, mechanistic with low risk, organic with high risk and organic with low risk) which are then grouped into two different system designs: 1) Mechanistic flow system design for the low

risk mechanistic task activities and the high risk organic task activities. 2) Organic system design for the low risk organic task activities and the high risk mechanistic task activities.

4. This research indicates that the standard Value Stream Mapping technique will need some modification to handle office environments. The conventional value stream map has been successfully used to map mechanistic task activities that are simple, predictable and analysable, whereas, a new generation of value stream mapping was developed to allow the mapping of organic task activities that are complex, unpredictable and unanalysable. This study builds on the work of Magnusen (Robey 1991, Mullins 2007) and Burns and Stalker (1961) on the mechanistic and organic systems as well as the work of Womack on the Lean Consumption Map (Womack, Jones 2005) by proposing a new approach that can enable Value Stream Mapping to cope with the realistic mix of organic and mechanistic task activities.

5. This research also shows how tools such as the Viable Systems Model can be applied to the design of offices (or diagnostic analysis of offices) as most literature explores the advantages of using the VSM across organisations (Beer 1985, Beer 1989, Schwaninger 2006, Espejo, Harnden 1989). This model shows how the VSM can be used as a framework for diagnosing the office. The five constituent systems of the VSM were useful as a check of the subsystems of the office (i.e. seven management systems of the office that were used within the model of this study) to determine if they were present and if they were operating effectively.

6. This research also presents how tools such as the Competing Values Framework and the situational leadership can be applied to the redesign of offices (or the diagnostic analysis of offices) as part of this methodology of implementation. This is because most literature states the advantages of using the Competing Values Framework (Cameron, Quinn 1999, Cameron 2009) and the situational leadership (Mullins 2007, Huczynski, Buchanan 2007, Hersey, Blanchard et al. 2008) across organisations while giving little attention to the practical applicability

of such models. This study shows how these models can be used practically by following a simple step by step procedure to redesign two management systems of the office (i.e. organisational culture characteristics and adopted leadership style). This is considered to provide value to offices and add new dimensions to understanding these management systems of the office.

8.6   General Limitations of the Adopted Methodology

All research methods have some limitations. This research has accepted the limitations of the research methods adopted within it whilst taking a proactive approach with regards to counteracting or minimising the effects of these limitations.

Case study research was the research strategy used within the pilot studies phase. Case study research and action research were also used as a combined research strategy to test and validate the model. Despite the fact that case study research plays a significant role in various research fields, it is usually criticised for its lack of rigour in the findings it generates due to the small sample size investigated. This puts challenges on the generalisation of the results of case study research (McCutcheon, Meredith 1993). Hamel, Dufour et al. (1993) criticised the scope of case study research by referring to it as microscopic. This is because they advocated that case study research is only relevant to the case under investigation (Hamel, Dufour et al. 1993) and often perceived as an anecdote leading to large amounts of uncontrolled text (Stuart 2002). However, case study research can gain wider acceptance if these perceptions were dispelled (McCutcheon, Meredith 1993).

A case study can be regarded as a fully scientific rigorous method if it follows particular criteria of validity, objectivity and reliability (Kyburz-Graber 2004). These criteria can be addressed by both carefully designing the study's conceptualisations and addressing the method used to collect, analyse and interpret the data (Merriam 1988). Although this research accepts the limitations of case study research, it was attempted to adopt four validity tests to respond to common criticisms of case study research as advocated by Yin (2003) and Yin (2009). The validity tests adopted in both the pilot study phase and the model testing and validation phase of this

research inquiry are summarised in Tables (8.1 & 8.2), based on the work of Yin (2003) and Yin (2009). These adopted validity tests are discussed for each part of this research inquiry in more detail below:

1. Construct validity focuses on establishing the right measures for the studied concepts (Yin 2003). Table (8.1 and 8.2) shows how threats to the construct validity of this research project, which were related to the sample size of the respondents, were minimised using the following tactics: A) The use of triangulation through multiple data sources. B) The use of triangulation of mixed methods research as a development to the data collection method used to populate the model which was tested using the 2nd case study (i.e. Rolls Royce). C) The establishment of chain of evidence through triangulation. D) The establishment of chain of evidence by allowing an external observer to follow the derivation of any evidence from initial research question to ultimate case study conclusion. E) It was considered that six in-depth interviews were adequate to identify the themes from the pilot studies when the opinions and views emerging were showing consistent patterns and no new information had emerged by interviewing extra people. F) Interviews were carried out with the manager of each case study office to help judge the suitability of the case study to this research. In addition, these interviews aimed to investigate the variation of the tasks of each office to determine the appropriate number of people required to be interviewed. On the other hand, Table (8.2) presents how the construct validity of this research was enhanced by validating the model and its findings using the subjective opinion of the manager (i.e. expert) of each office contributing to this study (Yin 2009).

2. Internal validity focuses on explanatory studies by explaining the research design and data used to make inferences or draw conclusions about the causal relationships between the variables (Yin 2003). Pattern matching helps the researcher to compare a pattern, which emerged empirically, with a predicted one (Yin 2003). Explanation building is a form of pattern matching which aims to analyse the case study data by forming explanations about the case (Yin 2003).

Table (8.1) and Table (8.2) illustrate how threats to the data analysis approach used within this research inquiry were eliminated using the following tactics: A) The use of coding and tabular display of evidence in the pilot studies phase to conduct pattern matching logic. B) The use of both pre-coding (i.e. by utilising the conceptual model to guide data collection and analysis) and tabular display of evidence during the model testing and validation phase in order to conduct pattern matching logic. C) The use of explanation building logic (i.e. supporting the explanation of the observed phenomenon using the findings of the interviews) within both the pilot study phase and the model testing and validation phase.

3. External validity focuses on setting up a domain that can be used to generalise the findings of a study (Yin 2003). Replication logic underlies the use of multiple case studies to find out if each of the carefully selected case studies predicts similar or contrasting results that can support the model (Yin 2003). Table (8.1) and Table (8.2) show how the generalisability of this study was enhanced through the use of tactics during the research design, which strengthens the external validity of this research. These tactics are: A) The use of theories in single case studies by ensuring that the research design of both the pilot study phase and the model testing and validation phase addressed the theoretical questions. B) The use of literal replication during the model testing and validation phase by choosing two case studies, which predominantly exhibited organic characteristics, to see if applying them to the model produced replicable results. When the results of the two case studies were compared, they were found to be replicated which strengthened the external validity of the model. This is explained in more detail in section 6.4.

4. Reliability focuses on demonstrating that the study's operations such as data collection methods can be repeated and can generate similar results (Yin 2003). A case study protocol is the principal documentation required to assist the researcher by organising his/her visits to the research sites, keeping him/her focused on the type of data required and making sure that the sources of evidence are fully documented (Stuart 2002). A Case study database is a

database that enables the inspection of the collected raw material by an independent inspector and it contains information such as notes, documents, narratives and tabular material (Yin 2003). Table (8.1) and Table (8.2) present how issues of bias within the case studies were reduced through the use of various tactics (Amaratunga, Baldry et al. 2002). These tactics are: A) The use of a case study protocol for the pilot studies phase as shown in Appendix (F). B) The use of a case study protocol for the model testing and validation phase as shown in Appendix (O). C) The use of a case study databases for each of the pilot studies (i.e. Research office and finance office case studies) as shown in Appendices (D and E). D) The use of a case study databases for each of the case studies (i.e. Rolls Royce and Siemens case studies) used to test and validate the model as shown in Appendices (M and N). E) By comparing the opinions of the manager of each office against each other during the model validation phase.

Table (8.1) illustrates various validity tests that were used in the pilot studies phase.

Test	Case Study Tactic	Tactics Carried Out in Pilot Study Phase
Construct validity	• Triangulation using multiple sources of evidence • Establish chain of evidence	• Triangulation through multiple sources of data (i.e. interviews and direct observations) • Established chain of evidence by allowing an external observer to follow derivation of any evidence from initial research question to ultimate case study conclusion • Established chain of evidence through triangulation
Internal validity	• Conduct pattern matching • Conduct explanation–building	• Coding of data and the use of tabular display of evidence • Supporting the explanation of the observed phenomenon using the findings of the interviews
External validity	• Use theories in single case studies	• Ensure that research design addresses the theoretical questions
Reliability	• Use case study protocol • Use case study database	• Case study protocol was used as a tool for guidance as well as communication of intentions within the research sites • Databases were created to gather all important information together

Source: Adapted from (Yin 2003).

Table (8.2) shows various validity tests that were used in the model testing and model validation phase.

Test	Case Study Tactic	Tactics Carried out in Model Testing & Validation Phase
Construct validity	• Triangulation using multiple sources of evidence • Triangulation using mixed methods research • Establish chain of evidence • Have key informant review a case study report	• Triangulation through multiple sources of data (i.e. interviews and direct observations and documents) • Triangulation through mixed methods research in the 2nd case study • Established chain of evidence by allowing an external observer to follow derivation of any evidence from initial research question to ultimate case study conclusion • Established chain of evidence through triangulation • Model and its findings were validated by asking the subjective opinion of the manager of each research site
Internal validity	• Conduct pattern matching • Conduct explanation–building	• Pre-coding of data (i.e. using the conceptual model to guide data collection and analysis) and the use of tabular display of evidence • Supporting the explanation of the observed phenomenon using the findings of the interviews
External validity	• Use theories in single case studies • Use replication logic in multiple-case studies	• Ensure that research design addresses the theoretical questions • The use of literal replication in two case studies exhibiting predominantly organic tasks
Reliability	• Use case study protocol • Use case study database	• Case study protocol was used as a tool for guidance as well as communication of intentions within the research sites • Databases were created to gather all important information together • By comparing the opinions of the manager of each office against each other

Source: adapted from (Yin 2003, Yin 2009).

The two case studies, which were used to test and validate the model, only considered offices with low level of risk. I suggest that this may put another case for future work because risk is regarded to be a control variable within this model. This can be done by investigating cases with high level of risk within other service sectors and office types. For instance, a researcher may investigate an air traffic controller office, medical clinics with high risks and offices of nuclear power plants.

As mentioned earlier in section 7.7 although limitations, which are related to both the busy nature of managers and the Hawthorne/reactive effects could not be traced while validating the model. Other limitations existed, such as using a limited sample of respondents to validate the model and the bias and lack of the knowledge of the two managers involved in validating the model.

The data collection methods used in this research involved interviews, direct observations and documents. The limitations of these data collection methods were accepted while being aware of them and attempting to reduce them. For instance, the limitations of using interviews were reduced by: 1) The use of practice interviews with other research colleagues prior the real interviews. 2) The use of prompts (e.g. asking 'what about…?' questions) throughout the real interviews where the researcher inquired about issues captured from other data collection sources (e.g. observations or documents) to ensure that all interviews cover similar issues of investigation (Gillham 2000). 3) Being aware of the verbal or the non verbal feedback to avoid influencing the interviewee (Tashakkori, Teddlie 1998). 4) Being aware of the deception in the answer of the interviewee by further questioning and pushing the respondents to provide examples if it was suspected that they were giving an answer that was wished to be heard (Creswell 2004). The disadvantages of using direct observations as a data collection technique (e.g. being troublesome and time consuming) were reduced by accurately writing the observations as soon as they were made (Gillham 2000). In addition, the office was intentionally observed under normal working conditions. The disadvantages of using documents are related to containing information that is hard to understand as well as experiencing difficulty in determining their accuracy and authenticity due to the anonymity of the people who created them (Merriam 1988). These disadvantages were avoided by asking the person who provided the documents to give a brief introduction and description about them.

8.7   Model Strengths

The results of testing the model using the Rolls Royce case study, shown in section 6.3.4 in Chapter 6, successfully showed how this model enabled the design of offices

while considering a realistic mix of organic and mechanistic task activities. It was shown how three organic task activities as well as one mechanistic task activity were redesigned within the office in parallel. This in return confirmed how this tool builds on the work of Magnusen (Robey 1991, Mullins 2007) and Burns and Stalker (1961). The ability to cope with a mix of organic and mechanistic tasks is considered to add a new dimension to office design by having comprehensive continuous improvement initiative. This continuous improvement can be instigated by the utilisation of Value Stream Mapping in a way that can cope with the mix of organic and mechanistic tasks. Consequently, the conventional form of Value Stream Mapping has been used within the model to map mechanistic task activities which enables continuous improvement to them. Also a new version of Value Stream Mapping has been used within the model to map organic task activities. This means that continuous improvements are proposed to both organic and mechanistic task activities and not just limited to mechanistic task activities.

8.8   Model Limitations

Although the model of this study is large, it approaches the design of offices and their management systems in a simple step by step set of guidelines. Every effort was made to simplify the model of this study. However, the model still consisted of a high number of stages as shown in Figure (7.1) in Chapter 7, which made the managers who were involved in the model testing and validation perceive the model as complex. It is considered that this complexity requires the manager's time and understanding of the model. This prompted the need to train the manager who will use this model to reduce any perceived complexity. However, this training can be time consuming and costly to the organisation.

One of the limitations of the model is related to the fact that managers, who will use this tool to redesign or diagnose their office, are required to have considerable knowledge of the nature of the office, its operations and various management systems. This is because accurate data is needed to be collected throughout the various stages of the model. For example, a newly hired manager may not be able to redesign the office because detailed and accurate knowledge about the office is

required to implement the various steps of the model. An example of the accurate responses needed to populate the model was witnessed in the use of a five point scale in the semantic differential scale shown in Table (6.6) in Chapter 6.

It is paradoxical how the model provided insights about the implementation of the design of offices and their management systems. However, I could not judge if it would require my presence alongside the manager. The manager of the office may require a certain type of support while using this tool. I propose this support to be carried out in one of the following manners: 1) A consultant who is present alongside the manager while using the tool. 2) An expert system to provide answers to the manager while using the tool. This may be a case for future work. This can be done by investigating if a manager can solely carry out this implementation methodology in other service sectors and office types of different nature, however, this was beyond the time limit of this study.

Another potential limitation of the model is related to its linear or sequential nature. It was observed that linear type models seem to get criticised in terms of their inflexibility in changing directions. For instance, a successful linear model for implementing change in organisations is the John Katter's Change Model (Kotter 1996), which was criticised with both leading to wrong assumptions and causing inflexibility in changing direction after starting the work. Consequently, it is considered that the linearity of this model may cause similar limitations in terms of being inflexible in both changing directions and/or coping with managers with different objectives.

Most up to date theories (e.g. Situational Leadership, Viable System Model and Competing Values Framework), which were used within the model of this study, have been accepted as they are whilst being aware of their limitations.

8.9   <u>Summary</u>

This chapter started by presenting the revised research objectives of this study, how they were achieved and a discussion about the methodology used to achieve them. Thereafter, the reasons behind developing the model were presented. In addition,

the value of the model and the substantial theoretical contributions of this research inquiry were stated. The limitations of the adopted methodology and research methods were presented. The model strengths and limitations were also outlined.

The next chapter will present the final conclusions of this research inquiry. It briefly discusses how the aims and the research questions of this research inquiry were met. It also presents clear answers to the research questions of this study. In addition, it summarises the contributions to knowledge, research limitations and recommendations for future work.

9 *CHAPTER NINE: Final Conclusions*

The issues related to the redesign of offices to make them more effective and leaner were presented in the opening chapters of this thesis. These chapters presented an extensive review and highlighted the motivation behind this work. The aims of this project were achieved by developing a methodology of implementation for office design. This methodology was tested and validated in Chapters 6 and 7 respectively.

This chapter presents the final conclusions of this research inquiry. It summarises how the aims of this research inquiry were achieved. In addition, it presents answers to the research questions that guided the research process. The contribution to knowledge is also presented. The limitations of the research are also summarised as well as the recommendations for future work.

9.1 Achievements of the Research

Piercy and Rich (2009) argue that service businesses are currently struggling with both customer demands for better quality of service and managerial demands for cost reduction. They argue that there is evidence suggesting that service businesses are in practice failing on both these counts as they are facing increased costs along with deteriorating service quality (Piercy, Rich 2009). Thompson (1997) and Tapping and Shuker (2003) argue that manufacturing companies tend to concentrate on having competitive advantage through enhancing the manufacturing processes whilst often overlooking office domains as a source of a competitive advantage. However recently the global market is becoming increasingly competitive, and for companies to compete in a large scale competitive market, they have to work hard on improving the overall business process including the office domain (Thompson 1997). In addition, Tapping and Shuker (2003) argue that sixty to eighty percent of the cost related to a product or service line is associated with non-production processes (Tapping, Shuker 2003). These administrative non-production processes play a fundamental role in maintaining the business by ensuring that the product or

the service is ordered, shipped and paid for, this makes offices a source of huge and often overlooked opportunity for improvement (Tapping, Shuker 2003).

At the beginning of this research I had an interest in applying lean tools and techniques such as Value Stream Mapping in the design of offices to make them more effective. However, Emiliani argues that the application of lean tools and techniques has been limited to certain office types/parts (Emiliani 2007a). Emiliani and Moad argue that there have been many challenges in applying value stream mapping in office domains because it has been utilised in certain office parts/types and not others (Moad 2008, Emiliani 2007b). Also Radnor argues that the development and application of lean tools and techniques within the service sectors (e.g. the public sector) are still under researched (Radnor 2010). This made me think of the reasons why this area has been underdeveloped and has been facing various limitations. So I started looking at new ways to redesign the office to make them more effective and leaner. At the same time I attempted to investigate the reasons behind the limitations of applying lean tools and techniques such as Value Stream Mapping into various office types/parts as advocated by Emiliani (2007a). However, my initial aim was to redesign the whole office and not just apply lean tools and techniques. This prompted the need to look at offices as a whole to identify and understand various management systems that can represent the design components of the office. So I also started looking at various tools and techniques which can help in the better understanding of offices and their management systems. After exploring various tools, variables and models, which were found to provide insights and understanding about offices, I linked them to the literature related to the applicability of lean tools and techniques such as Value stream mapping as shown in section 2.9. This was done in order to attempt to justify why there have been limitations in the applicability of lean tools and techniques such as Value Stream Mapping in various office parts/types. As a result it was concluded as shown in section 2.9 that the conventional form of Value Stream Mapping tended to be used to map mechanistic task activities which are simple, predictable and analysable. This indicated the need to create a new version of Value Stream Mapping which can be used to map organic task activities which are complex, unpredictable and unanalysable. These new

insights, which are related to the applicability of the Value Stream Mapping into various office types/parts, were exploited while building the model of this study.

This study focused on Value Stream Mapping because it was considered a catalyst that can help the employees to create change. The significance of Value Stream Mapping in this study is related to the fact that it is one of the most significant lean tools and techniques, as Pepper and Spedding (2010) argue that Value Stream Mapping needs to be methodically applied before other tools such as 5S to achieve a truly lean operation. This is considered to provide the opportunity to implement a lean system (Pepper, Spedding 2010).

It is worthwhile to note that the need for this study was further strengthened by latest publications in the area of applying lean tools and techniques within office domains. These authors include Radnor (2010), (Emiliani) 2007a, Tapping and Shuker (2003), Moad (2008), Emiliani (2007b) and Keyte and Locher (2004).

The aims of this research have been achieved by developing a set of guidelines in the form of a methodology of implementation for redesigning offices and their management systems. This design tool incorporates the use of the following dimensions or concepts: 1) Seven original office management systems (e.g. organising activities / actors, leadership style, technology characteristics, organisational culture characteristics, work unit planning, assessing individuals' and employees' support). 2) A set of variables (e.g. task uncertainty, interdependence, task complexity, mechanistic or organic, risk, analysability etc.) which help the manager better understand the offices and its management systems. 3) The use of models (e.g. Viable System Model, Competing Values Framework and Situational Leadership) to represent various aspects or management systems of the office. 4) The use of Value Stream Mapping to map the task activities of the office. This involves a new generation of value stream mapping to map organic task activities along with the conventional value stream mapping to map mechanistic task activities. 5) The design of offices based on the work of Burns and Stalker (1961) and Magnusen (i.e. offices are realistically a mix of organic and mechanistic task activities) (Robey 1991, Mullins 2007). 6) The design of the office while considering

the impact of the risk level on the design of any mechanistic/organic task activities of the office based on the work of Robey (1991) and Lin (2006).

9.2   Answers to the Research Questions

This research inquiry was guided by answering four research questions. The answers of each of the research questions are presented below:

- **Research Question 1: What is the list of variables needed to characterise offices and the design of its various management systems?**

This list of variables was initially identified by reviewing literature related to offices and the design of their management systems, as shown in Chapter 2. It includes variables such as task uncertainty, task complexity, task analysability, interdependence, mechanistic or organic … etc. An exploratory pilot study phase was then carried out to confirm and refine the findings of the literature review. Most of the variables were confirmed as shown in section 3.2.7. Five more variables were identified as a result of this pilot study phase, as shown in section 3.2.8 in Chapter 3. At the end, around 50 variables were identified from the literature review as well as the pilot studies as shown in Tables (3.8 and 3.9) in Chapter 3.

- **Research Question 2: What are the main office management systems needed to redesign an office?**

Since an office can be considered as a small organisation (Galbraith, Downey et al. 2002), the management systems used as design components within three well-established organisational design models (e.g. VSM, McKinsey 7-S Model and Galbraith Star Model) were explored. In parallel, the management systems, which emerged as a result of the analysis of the pilot studies phase, were compared with the subsystems used in rival theories as advocated by Christopher and Towill (2001). This comparison was carried out to inspect if the results of the pilot studies were representative of offices. This was done by using the constituent systems of the VSM, Galbraith Star Model and McKinsey 7-S as a check of the subsystems of the office to determine if they were present as shown in Table (4.2) in Chapter 4.This

managed to show how the management systems of offices were identified to represent the redesign or diagnosis of offices. The office management systems, which were identified, are organising activities / actors, leadership style, technology characteristics, organisational culture characteristics, work unit planning, assessing individuals and employees' support. This illustrates the link between the pilot study findings shown in Chapter 3 to the exploration of the literature of organisational design models presented in Chapter 2.

- **Research Question 3: How can an office be redesigned / diagnosed in terms of each of its main management systems with the aim of making it leaner and more effective?**

This question is related to the main aim of this research inquiry. To answer this research question, the previously identified seven management systems of the office were used to build the model. Thereafter, the model was built based on the causal relationships identified from the cited literature as shown in section 5.4 in Chapter 4. Also it was built based on theoretical assumptions derived from the cited literature as well as the findings of the pilot studies as shown in sections 5.5.1 and 5.5.2 in Chapter 4. One of the main theoretical assumptions used was related to the redesign of offices in terms of a mix of organic and mechanistic task activities based on the work of Magnusen (Robey 1991, Mullins 2007).

Thereafter, this conceptual model had to be further developed and refined by testing and validating the model as shown in Chapter 6. As a result of testing the model, various improvements to the model were carried out as shown in sections 6.2.6, 6.3.6 and 6.5.1. The model was supported because testing the model using two case studies exhibiting similar characteristics produced replicated results as shown in section 6.4. The final version of the tested model was presented in Figure (6.14). At the end, the tested model was further validated using the subjective opinions of the manager of each office contributing to the case studies. This resulted in a final version of the model as shown in Figure (7.1) in Chapter 7. The final model consists of the following phases:

1. Phase One – Define the Office Current State. This phase is related to identifying the characteristics of the current state of the office in terms of various variables.

2. Phase Two – Redesign / Diagnose the Office by creating its Future State in terms of the Seven Management Systems of the Office.

3. Phase Three – Continuous Improvements Phase. This phase is related to initiating lean continuous improvement within the office by creating future states of the various task activities of the office using value stream mapping.

- **Research Question 4: How can organic task activities, which tend to be complex, uncertain and unanalysable, be mapped using a new version of Value Stream Mapping?**

The literature was explored to identify ideas from other mapping techniques and concepts that may be used to map organic task activities in office domains. A new generation of value stream mapping was mainly deduced from the Lean Consumption Map which was invented by Womack and Jones (2005) to streamline a company's consuming process as shown in section 4.9 in Chapter 4. It was found suitable because it breaks down the task activity in terms of provider and consumer which provides an opportunity to explain and present the interactions in greater depth. In addition, the black box concept was considered to be suitable for mapping any unanalysable or complex tasks within the organic task activity. Other creative graphical modifications arising from this research were also added. This resulted in having a new generation of value stream mapping tools to map organic task activities as shown in sections 6.2.4 and 6.3.4 in Chapter 6. It was further tested by utilising action research strategy. Action research was carried out along with a team of various employees and the manager to test the new generation of value stream mapping using each of the organic case studies as shown in Chapter 6. This new generation of value stream mapping was also validated as shown in Chapter 7. At the end, this new generation of Value Stream Mapping was improved by adding a

brief description of certain characteristics (e.g. stakeholders' expectations and weak / strong) to the map.

9.3   <u>Contribution to Knowledge</u>

The work shown in this thesis contributes to new knowledge and theory about offices and the redesign of their management systems to make them run in a leaner and more effective way, as shown below:

1. This research provided guidelines to the managers of offices that allow them to redesign/diagnose their office to make them more effective and leaner. This design tool incorporates seven original office management systems and a set of variables (e.g. task uncertainty, interdependence etc.), which helps the manager better understand offices and their management systems.

2. This study builds on the work of Magnusen (Robey 1991, Mullins 2007) and Burns and Stalker (1961) by proposing a methodology of implementation which introduces a novel approach for redesigning offices while coping with the realistic mix of organic and mechanistic tasks that exists in most offices.

3. This research builds on the work of Robey (1991) and Lin (2006), which is related to identifying the implication of risk on the design of mechanistic and organic task activities within the office.

4. This study builds on the work of Magnusen (Robey 1991, Mullins 2007) and Burns and Stalker (1961) on the mechanistic and organic systems as well as the work of Womack on the Lean Consumption Map (Womack, Jones 2005) by proposing a new approach that can enable Value Stream Mapping to cope with the realistic mix of organic and mechanistic task activities.

5. This research also shows how tools such as the Viable Systems Model can be applied to the design of offices (or diagnostic analysis of offices). This model shows how the VSM can be used as a framework for diagnosing the office.

6. This research also presents how tools such as the Competing Values Framework and the situational leadership can be applied to the redesign / diagnosis of offices as part of this methodology of implementation by following a simple step by step procedure to redesign two management systems of the office (i.e. organisational culture characteristics and adopted leadership style).

9.4   <u>Limitations of the Research</u>

Although the model is large, it approaches the design the management systems of offices in a simple step by step procedure. However, the model still consisted of a high number of stages and was perceived as complex as shown in Figure (7.1) in Chapter 7. This prompted the need to train the manager which can be time consuming and costly.

One of the limitations of the model is related to the fact that managers, who will use this tool to redesign or diagnose their office, are required to have considerable knowledge of the nature of the office, its operations and various management systems. This is because accurate data is needed to be collected while populating the model.

I could not judge if it would require my presence alongside the manager. The manager of the office may require a certain type of support while using this tool. I propose this support to be carried out in one of the following manners: 1) A consultant who is present alongside the manager while using the tool. 2) An expert system to provide answers to the manager while using the tool. This may be a case for future work. This can be done by investigating if a manager can solely carry out this implementation methodology in other service sectors and office types of different nature, however, this was beyond the time limit of this study.

Another potential limitation of the model is related to its linear or sequential nature. This linearity may cause inflexibility in both changing directions and/or coping with managers with different objectives. It is also worthwhile to note that most up to date theories (e.g. Situational Leadership, Viable System Model and Competing Values

Framework), which were used within the model of this study, have been accepted as they are whilst being aware of their limitations.

9.5   Recommendations for Future Work

Various recommendations for future work in the area of offices and the design of their management systems, which were beyond the time limit of this study, are listed below:

1. In order to examine the verification of the office management systems and the variables that can help to better understand them, it is recommended that future researchers investigate the following: 1) The literature concerned with aspects of the work related to the office management systems and any variables related to understanding them. 2) Pilot studies with the aim of further examining the office management systems in offices of different nature that are operating in different sectors.

2. The limited validity of this research was carried out for two small organic consulting type offices. This makes this study generalisable for consulting type of offices that are small in size. Hopefully, this work is valid for other office types but it needs to be further investigated and proven. This limited validity puts a case for future work. Consequently, it is recommended to test this methodology of implementation in service offices operating in different industrial sectors in order to understand its applicability and suitability in other working environments. It is also recommended to test this model for offices with different sizes. This recommendation should also address testing the new form of Value Stream Mapping to understand its applicability and suitableness in other working environments.

3. Further explore and investigate the effect of level of risk on the design of the various task activities of office, because risk is regarded to be a control variable within this model. This can be done by investigating cases with high level of risk within other service sectors and office types. This may involve the investigation of offices with mechanistic/organic task activities with high levels of risk. For

instance, future researchers may investigate an air traffic controller office, medical clinics and/or offices of nuclear power plants.

4. One more direction for a follow-up study is to involve future researchers on a participant basis in a longitudinal study. This study can be of an office that is needed to be redesigned by its manager to make it more effective and leaner. The aim would be to quantitatively validate the model on the light of the findings of the methodology of implementation (i.e. the new design recommendations). Because this in return will enhance the previously gained results. This will add a new dimension to the validation of the model by overcoming the various limitations which arose from the approach used to validate the model of this study.

5. To attempt to judge if the implementation of this tool requires the presence of a consultant alongside the manager or if it would require an expert system to provide answers to any managers using the tool. This can be done by investigating if a manager can solely carry out this implementation methodology in other service sectors and office types of different nature after providing them with brief training.

6. A retrospective study is recommended to track the impact of using this tool in terms of two dimensions: 1) An effective tool for redesigning offices by their managers. 2) A comprehensive office design strategy, which is an effective enabler of continuous improvements.

7. It is recommended to investigate offices which consist mainly of a high number of short task activities (i.e. task activities which consists of one to two tasks). This is recommended in order to identify the effect of these types of tasks on the model particularly if they impose any limitations on the use of value stream mapping.

8. Extend the present research to develop a risk assessment framework for this tool which can be utilised within stage 24 of the final version of the model shown in Figure (7.1). This assessment can focus on addressing various risks that may

arise while incorporating the new design recommendations of the office. It can focus on investigating practical solutions to overcome any barriers in the implementation of the new design recommendations of the model.

9. It is recommended to give future researchers a choice between: 1) Identifying models other than Situational Leadership and Competing Values Framework to represent the leadership style adopted and the organisational culture characteristics of the office. Because this may provide more understanding about the characteristics of these management systems. It is therefore recommended to investigate literature related to these aspects of the work. 2) If future researchers decide to accept the use of Situational Leadership and Competing Values Framework within this methodology of implementation while being aware of their limitations. Then it is recommended to test their use within this model in offices of different nature that are operating in different sectors.

10. In order to further explore and investigate the possibility of developing other performance measures which can be used within the new generation of value stream mapping. This can be done by investigating objective performance measurements that can provide more measurable, tangible benefits. Therefore, it is recommended to investigate literature concerned with this aspect of the work.

9.6   **Summary**

The aim of this completed work was to study offices and the design of their management systems with the aim of improving their effectiveness and leanness. The work done in the research was concluded in this chapter. It briefly discussed the aims of this research and how it was achieved. In addition, this chapter presented the substantial contributions to knowledge about offices and the design of their management systems. The limitations of the research were discussed as well as the recommendations for future work.

References

ADAMS, D. and HAYNES, D., 2007. Stafford Beer's Contribution to Management Science - Renewal & Development. *Kybernetes,* **36**(3/4), pp. 437-450.

AL-HINDAWE, J., 1996. Considerations When Constructing a Semantic Differential Scale. *La Trobe Papers in Linguistics.*

ALLISON, M., 26/6/2009, 2009-last update, creating a Culture of Leadership & Learning -- EI Leadership vs. Situational Leadership [Homepage of Changing minds organisation], [Online]. Available: http://changingminds.org/articles/articles09/ei_leadership.htm [15/09/2010, 2010].

AMABILE, T.M., HADLEY, C.N. and KRAMER, S.J., 2002. Creativity: Under the Gun. *Harvard Business Review.*

AMARATUNGA, D., BALDRY, D., SARSHAR, M. and NEWTON, R., 2002. Quantitative and Qualitative Research in the Build Environment: Application of "mixed" research approach. *Work Study,* **5**1(1), pp. 17-31.

ASHBY, W.R., 1956. *An Introduction to Cybernetics.* London: Chapman and Hall.

ATTRIDE-STIRLING, J., 2001. Thematic Networks: An Analytic Tool for Qualitative Research. *Qualitative Research,* 1(3), pp. 385-405.

BARNEA, A., 2008. Using the McKinsey 7-S Model to Improve Competitive Intelligence Capabilities. *Competitive Intelligence Magazine,* **1**1(3), pp. 51-52.

BEAUMONT, J.R., 1990. Office Automation: Myth or Reality? *Work Study,* **3**9.

BEER, S., 1989. The Viable System Model: Its Provenance, Development, Methodology and Pathology. *www.managementkybernetik.com.*

BEER, S., 1985. *Diagnosing the System for Organizations.* Chichester: Wiley.

BEER, S., 1979. *The Heart of Enterprise.* Chichester: John Wiley.

BEER, S., 1972. *Brain of the Firm.* Harmondsworth: Allan Lane.

BERRIO, A.A., 2003. An Organizational Culture Assessment Using the Competing Values Framework: A Profile of Ohio State University Extension. *Journal of Extensions,* **4**1(2).

BISSELL, C., 2001. Inventing the 'Black Box': Mathematics as a neglected enabling technology in the history of communications engineering. *The Open University.*

BLILI, S., RAYMOND, L. and RIVARD, S., 1998. Impact of Task Uncertainty, End-User Involvement and Competence on the Success of End-User Computing. *Information and Management,* **3**3(3), pp. 137-53.

BOBBITT, H.R. and FORD, J.D., 1980. Decision-Maker Choice as a Determinant of Organisational Structure. *Academy of Management Review,* **Januar**y, pp. 13-23.

BOISNIER, A.D. and CHATMAN, J., 2003. The Role of Subcultures in Agile Organizations. In: R. PETERSEN and E. MANNIX, eds, *Leading and Managing People in Dynamic Organizations.* London: Lawrence Erlbaum Associates, pp. 87-112.

BONOMA, T.V., 1985. Case Research in Marketing: Opportunities, Problems, and a Process. *Journal of Business Research,* **1**2, pp. 199-208.

BRYMAN, A., 1989. *Research Methods and Organization Studies.* London: Unwin Hyman.

BRYMAN, A. and BELL, E., 2007. *Business Research Methods.* 2nd edn. Oxford, UK: Oxford University Press.

BRYMAN, A. and BELL, E., 2003. *Business Research Methods.* Oxford: Oxford University Press.

BURNS, T. and STALKER, G.M., 1961. *The Management of Innovation.* London: Tavistock.

BYSTROM, K. and JARVELIN, K., 1995. Task Complexity Affects Information Seeking and Use. *Information Processing & Management,* **3**1(2), pp. 191-213.

CAMERON, K., 2009. *An Introduction to the Competing Values Framework.* www.haworth.com edn. Holland: Haworth.

CAMERON, K.S. and QUINN, R.E., 1999. *Diagnosing and changing organizational culture.* Reading: Addison-Wesley.

CAMPBELL, D.J., 1988. Task Complexity: A Review and Analysis. *The Academy of Management Review,* **1**3(1), pp. 40-50.

CHANG, R.D., CHANG, Y.W. and PAPER, D., 2003. The Effect of Task Uncertainty, Decentralization and AIS Characteristics on the Performance of AIS: An Empirical Case in Taiwan. *Information & Management,* **4**0, pp. 691-703.

CHENG, J.L.C., 1983. Interdependence and Coordination in Organizations: A Role-System Analysis. *Academy of Management Journal,* **2**6, pp. 156-62.

CHENHALL, R.H., 2003. Management Control Systems Design within its Organizational Context: Findings from Contingency-Based research and Directions for the Future. *Accounting, Organizations and Society,* **2**8, pp. 127-168.

CHILD, J., 2005. *Organization: Contemporary Principles and Practice.* Blackwell Publishing.

CHILD, J., 1972. Organizational Structure, Environment, and Performance: The Role of Strategic Choice. *Sociology,* 6, pp. 1-22.

CHRISTOPHER, M. and TOWILL, D., 2001. An Integrated Model for the Design of Agile Supply Chains. *International Journal of Physical Distribution and Logistics Management,* **3**1(4), pp. 235-246.

COGHLAN, D. and BRANNICK, T., 2005. *Doing Action Research in Your Own Organisation.* 2nd edn. London: Sage.

CORBETTA, P., 2003. *Social Research: Theory, Methods and Techniques.* London: Sage.

COURTRIGHT, J.A., FAIRHURST, G.T. and ROGERS, L.E., 1989. Interaction Patterns in Organic and Mechanistic Systems. *Academy of Management Journal,* **3**2, pp. 773-802.

COVIN, J.G. and SLEVIN, D.P.1989, Strategic Management of Small Firms in Hostile and Benign Environments. *Strategic Management Journal,* **1**0, pp. 75-87.

CRESWELL, J.W., 2009. *Research Design - Qualitative, Quantitative, and Mixed Methods Approaches.* 3rd edn. Thousand Oaks, California: Sage Publications, Inc.

CRESWELL, J.W., 2004. *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research.* 2nd edn. Upper Saddle River, New Jersey, Columbus, Ohio: Pearson Education.

CRESWELL, J.W., 2003. *Research Design Qualitative, Quantitative, and Mixed Method Approaches.* 2nd edn. Thousand Oaks, London, New Delhi: Sage.

CRESWELL, J.W. and PLANO CLARK, V.L., 2006. *Designing and Conducting Mixed Methods Research.* Thousand Oaks, CA: Sage Publications.

CUADRA, C.A. and KATTER, R.V., 1967. Opening the Black Box of 'Relevance'. *Journal of Documentation,* **2**3(4), pp. 291-303.

CYERT, R.M. and MARCH, J.G., 1963. *A Behavioral Theory of the Firm.* Englewood Cliffs, New Jersey: Prentice Hall.

DAFT, R.L., 2001. *Essentials of Organization Theory & Design.* South-Western College Publishing.

DAFT, R.L. and LENGEL, R.H., 1986. Organizational Information Requirements, Media Richness and Structural Design. *Management Science,* **3**2, pp. 554-71.

DESS, G.G. and BEARD, D.W., 1984. Dimensions of Organizational Task Environments. *Administrative Science Quarterly,* **2**9, pp. 52-73.

DIEFENBACH, T., 2009. Are Case Studies more than Sophisticated Storytelling?: Methodological problems of qualitative empirical research mainly based on semi-structured interviews. *Quality and Quantity,* **4**3(6), pp. 875-894.

DILL, W.R., 1958. Environment as an Influence on Managerial Autonomy. *Administrative Science Quarterly,* 2, pp. 409-43.

DIRKS, K.T. and FERRIN, D.L., 2001. The Role of Trust in Organizational Settings. *Organization Science,* **1**2(4), pp. 450-467.

DUGGAN, K., 2007. Flowing Toward Excellence. *Industrial Management,* **4**9(6), pp. 20-24.

DUNCAN, D., 1981. *Organisational Behaviour.* Boston, MA: Houghton Mifflin.

DUNCAN, R.B., 1972. Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly,* **1**7, pp. 313-327.

EASTERBY-SMITH, M., THORPE, R. and LOWE, A., 2002. *Management Research - An Introduction.* 2nd edn. London: Sage Publications Ltd.

EDEN, C. and HUXHAM, C., 1996. Action Research for Management Research. *British Journal of Management,* 7(1), pp. 75-86.

EISENHARDT, K.M., 1989. Building Theories from Case Study Research. *Academy of Management Review,* **1**4(4), pp. 532-50.

EMILIANI, M.L., 2007a. *Real Lean: Critical Issues and Opportunities in Lean Management.* Wethersfield, CT: The Center for Lean Business Management.

EMILIANI, M.L., 2007b. *Real Lean: Understanding the Lean Management System.* Wethersfield, CT: The Center for Lean Business Management.

ESPEJO, R. and GILL, A., 2002-last update, The Viable System Model as a Framework for Understanding Organizations [Homepage of The Modern times Workplace], [Online]. Available:

http://www.moderntimesworkplace.com/good_reading/GRRespSelf/TheViableSystemModel.pdf [June/18, 2008].

ESPEJO, R. and HARNDEN, R., 1989. *The Viable Systems Model: Interpretations and Applications of Stafford Beer's VSM.* Chichester: Wiley.

FREDRICKSON, J.W., 1986. The Strategic Decision Process and Organization Structure. *Academy of Management Review,* **1**1(2), pp. 280-297.

FREEMAN, E., 1984. *Strategic Management: A Stakeholder Approach.* London: Pitman.

FROOMAN, J., 1999. Stakeholder Influence Strategies. *Academy of Management Review,* **2**4(2), pp. 191-210.

GAGLIARDI, P., 1986. The Creation and Change of Organizational Cultures: A Conceptual Framework. *Organization Studies,* **7**2, pp. 117-134.

GALBRAITH, J.R., 1995. *Designing Organizations: An Executive Briefing on Strategy, Structure, and Process.* San Francisco: Jossey-Bass.

GALBRAITH, J.R., 1973. *Designing Complex Organizations.* Reading, MA: Addison-Wesley Pub. Co.

GALBRAITH, J.R., DOWNEY, D. and KATES, A., 2002. *Designing Dynamic Organizations.* New York: American Management Association.

GERLOFF, E.A., MUIR, N.K. and BODENSTEINER, W.D., 1991. Three Components of Perceived Environmental Uncertainty: An Exploratory Analysis of the Effects of Aggregation. *Journal of Management,* **1**7(4), pp. 749-768.

GHANI, K.A., JAYABALAN, V. and SUGUMAR, M., 2002. Impact of Advanced Manufacturing Technology on Organizational Structure. *Journal of High Technology Management Research,* **1**3, pp. 157-175.

GHAURI, P. and GRONHAUG, K., 2005. *Research Methods in Business Studies: A Practical Guide.* 3rd edn. Essex, England: Prearson Education Limited.

GHAURI, P.N., 1983. *Negotiating International Package Deals.* Stockholm: Almqvist & Wiksell.

GILLHAM, B., 2000. *Case Study Research Methods.* New York: Continuum.

GLASER, B. and STRAUSS, A., 1967. *The Discovery of Grounded Theory: Strategies of Qualitative Research.* London: Wiedenfeld and Nicholson.

GOODMAN, M., 1995. *Creative Management.* Prentice-Hall.

GORDON, G.G. and DI TOMASO, N., 1992. Predicting Corporate Performance from Organizational Culture. *Journal of Management Studies,* **Novembe**r, pp. 793-798.

GRAZIANO, A.M. and RAULIN, M.L., 2007. *Research Methods: A Process of Inquiry.* Boston: Pearson Education.

GRECO, J. 1999. OFFICE DESIGN, *Journal of Business Strategy*, **2**0(5), pp.12 – 15.

HABERBERG, A. and RIEPLE, A., 2001. *The Strategic Management of Organisations.* Harlow: Prentice Hall.

HAKKINEN, T. and NUUTINEN, M. 2007. Seeking sustainable solutions for office buildings, *Facilities*, **2**5(11/12), pp.437 – 451.

HAMEL, J., DUFOUR, S. and FORTIN, D., 1993. *Case Study Methods.* Newbury Park, CA: Sage Publications.

HARASYM, C.R., BOERSMA, F.J. and MAGUIRE, T.O., 1971. Semantic Differential Analysis of Relational Terms Used in Conversation. *Child Development,* **42**(3), pp. 767-779.

HAYNES, B.P. 2008. Impact of workplace connectivity on office productivity. *Journal of Corporate Real Estate*, **1**0 (4), pp.286 – 302.

HERRIOTT, R.E. and FIRESTONE, W.A., 1983. Multisite Qualitative Policy Research: Optimizing Description and Generalizability. *Educational Researcher,* **12**(2), pp. 14-19.

HERSEY, P. and BLANCHARD, K.H., 1998. *Management of Organizational Behaviour: Utilizing Human Resources.* Englewood Cliffs, NJ: Prentice Hall.

HERSEY, P., BLANCHARD, K. and JOHNSON, D., eds, 2008. *Management of Organizational Behavior: Leading Human Resources.* 9th edn. Upper Saddle River, NJ: Pearson Education.

HODGETTS, R.M., 1991. *Organizational Behavior: Theory and Practice.* New York: Macmillan.

HUBER, G.P., O'CONNELL, M.J. and CUMMINGS, L.L., 1975. Perceived Environmental Uncertainty: Effects of Information and Structure. *The Academy of Management Journal,* **18**(4), pp. 725-740.

HUBERMAN, A.M. and MILES, M.B., 2002. *The Qualitative Researcher's Companion: Classic and Contemporary Readings.* London: Sage.

HUCZYNSKI, A.A. and BUCHANAN, D.A., 2007. *Organizational Behaviour.* 6th edn. Essex, England: Financial Times Prentice Hall.

HUDSON, L. and OZANNE, J.L., 1988. Alternative Ways of Seeking Knowledge in Consumer Research. *Journal of Consumer Research,* **14**, pp. 508-21.

HULS, K., 2005. The Antioch Company brings 'lean' into the office. *Journal of Organizational Excellence,* **24**(4), pp. 31-38.

HUNTER, K., HARI, S., EGBU, C. and KELLY, J., 2005. Grounded Theory: Its Diversification and Application Through two Examples from Research Studies on Knowledge and Value Management. *Electronic Journal of Business Research Methods,* **3**(1), pp. 57-68.

JANKOWICZ, A.D., 1991. *Business Research Projects for Students.* London: Chapman & Hall.

JOHNS, G., 1992. *Organizational Behavior: Understanding Life at Work.* New York: Harper Collins.

KERVIN, J.B., 1999. *Methods for Business Research.* 2nd edn. Reading, MA: Addison-Wesley.

KEYTE, B., 2004. Value Stream Mapping in the Office, 2004.

KEYTE, B. and LOCHER, D., 2004. *The Complete Lean Enterprise: Value Stream Mapping for Administrative and Office processes.* New York: Productivity Press.

KING, W.R. and SABHERWAL, R., 1992. The Factors Affecting Strategic Information Systems Applications. *Information and Management,* **23**, pp. 217-235.

KINICKI, A.J. and VECCHIO, R.P., 2006. Influences on the quality of supervisor-subordinate relations: The role of time-pressure, organizational commitment, and locus of control. *Journal of Organizational Behavior,* **15**(1), pp. 75-82.

KOTTER, J.P., 1996. *Leading Change.* Boston: Harvard Business School Press.

KOTTER, J.P., 1978. *Organizational Dynamics: Diagnosis and Intervention.* Reading, MA: Addison-Wesley.

KOTTER, J.P. and HESKETT, J.L., 1992. *Corporate culture and performance.* New York: The Free Press.

KREISER, P. and MARINO, L., 2002. Analyzing the Historical Development of the Environmental Uncertainty Construct. *Management Decision,* **40**(9), pp. 895-905.

KVALE, S., 2007. *Doing Interviews.* Los Angeles, London: Sage Publications.

KYBURZ-GRABER, R., 2004. Does Case-Study Methodology Lack Rigour? The Need for Quality Criteria for Sound Case-Study Research. *Environmental Education Research,* **10**(1), pp. 53-65.

LAREAU, W., 2003. *Office Kaizen- Transforming Office Operations into A Strategic Competitive Advantage.* Milwaukee, Wisconsin: ASQ Quality Press.

LAWRENCE, P.R. and LORSCH, J.W., 1967. *Organization and Environment: Managing Differentiation and Integration.* Boston: Harvard University.

LIN, Z., 2006. Environmental Determination or Organizational Design: An Exploration of Organizational Decision Making Under Environmental Uncertainty. *Simulation Modelling Practice and Theory,* **14**, pp. 438-453.

LINCOLN, Y.S. and GUBA, E.G., 1985. *Naturalistic Inquiry.* Beverly Hills, California; London: Sage.

LISSEK, S., PINE, D.S. and GRILLON, C., 2006. The Strong Situation: A Potential Impediment to Studying the Psychobiology and Pharmacology of Anxiety Disorders. *Biological Psychology,* **72**, pp. 265-270.

LUCAS MINI GUIDE, 1991. *Lucas Engineering Systems.* Solihull.

MAGNUSEN, K.O., 1977. *Organizational Design, Development, and Behavior - A Situational View.* Glenview, Illinois: Scott, Foresman and Company.

MALONE, T.W. and CROWSTON, K., 1994. The Interdisciplinary Study of Coordination. *ACM Computing Surveys,* **26**(1), pp. 87-119.

MALONE, T.W., CROWSTON, K., LEE, J., PENTLAND, B., DELLAROCAS, C., WYNER, G., QUIMBY, J., OSBORN, C.S., BERNSTEIN, A., HERMAN, G., KLEIN, M. and O'DONNELL, E., 1999. Tools for Inventing Organizations: Toward a Handbook of Organizational Processes. *Management Science,* **45**(3), pp. 425-443.

MARSHAN-PIEKKARI, R. and WELCH, C., 2004. *A Handbook of Qualitative Research Methods for International Business.* Cheltenham: Edward Elgar.

MCCUTCHEON, D. and MEREDITH, J., 1993. Conducting Case Study Research in Operations Management. *Journal of Operations Management,* **11**(3), pp. 239-56.

MCKENNA, E., 2006. *Business Psychology and Organisational Behaviour.* East Sussex, UK: Psychology Press.

MEREDITH, J., 1998. Building Operations Management Theory through Case and Field Research. *Journal of Operations Management,* **16**(4), pp. 441-454.

MERRIAM, S.B., 1988. *Case Study Research in Education: A Qualitative Approach.* London: Jossey-Bass Ltd.

MILES, M.B. and HUBERMAN, A.M., 1994. *Qualitative Data Analysis: An Expanded Sourcebook.* 2nd edn. Beverly Hills, CA, London: Sage Publications.

MILES, M.B. and HUBERMAN, A.M., 1984. *Qualitative Data Analysis.* Beverly Hills, CA: Sage Publications.

MILLER, D. and FRIESEN, P.H., 1984. *Organizations: A Quantum View.* Englewood Cliffs, New Jersey: Prentice-Hall.

MILLIKEN, F.J., 1987. Three Types of Perceived Uncertainty about the Environment: State, Effect, and Response Uncertainty. *The Academy of Management Review,* **12**(1), pp. 133-143.

MINICHIELLO, V., ARONI, R., TIMEWELL, E. and ALEXANDER, L., 1990. *In-Depth Interviewing: Researching people.* Melbourne, Australia: Longman Cheshire.

MINTZBERG, H., 1979. *The Structuring of Organizations.* Englewood Cliffs, New Jersey: Prentice-Hall.

MISCHEL, W., 1977. The Interaction of Person and Situation, extracted from Chapter 25 from: Personality at The Crossroads - Current Issues in Interactional Psychology. In: D. MAGNUSSON and N.S. ENDLER, eds, *Personality at the Crossroads: Current Issues in Interactional Psychology.* New Jersey: Lawrence Erlbaum Associates.

MOAD, J., 2008. Extending lean into the enterprise (lean techniques in manufacturing processes). *Managing Automation,* **23**(2), pp. 16-22.

MODELL, S., 2009. In Defence of Triangulation: A critical realist approach to mixed methods research in management accounting. *Management Accounting Research,* **20**(3), pp. 208-221.

MOORHEAD, G. and GRIFFIN, R.W., 2004. *Organizational Behaviour: Managing People and Organisations.* 7th edn. Boston: Houghton Mifflin.

MULLINS, L.J., 2007. *Management and Organisational Behaviour.* 8th edn. Harlow, Essex, England: Pearson Education Limited.

MULLINS, L.J., 2002. *Management and Organisational Behaviour.* 6th edn. Harlow: Pearson Education Limited.

MYERS, J., SUMMER, C. and MARQUIS, D.G., 1969. Successful Industrial Innovation. In: D. MILLER and P.H. FRIESEN, eds, *Organizations A Quantum View.* Englewood Cliffs, New Jersey: Prentice-Hall.

NEUMAN, W.L., 2007. *Basics of Social Research: Qualitative and Quantitative Approaches.* 2nd edn. Boston, MA: Pearson.

NICOLIS, G., 1995. Introduction to the Physics of Complex Systems. In: S. CILIBERTO, T. DAUSOIS and M. DROZ, eds, *Physics of Complexity.* Paris: Editions Frontieres, pp. 1-18.

NOBLE, F., 1995. Implementation Strategies for Office Systems. *Journal of Strategic Information Systems,* **4**(3), pp. 239-253.

NUNEZ, A.N., GIACHETTI, R.E. and BORIA, G., 2009. Quantifying Coordination Work as a Function of the Task Uncertainty and Interdependence. *Journal of Enterprise Information Management,* **22**(3), pp. 361-376.

ORNE, M.T., 1961. On the Social Psychology of the Psychological Experiment: with particular reference
to demand characteristics and their implications. *American Psychologist,* **17**, pp. 776-83.

OSELAND, N. 2009. The impact of psychological needs on office design, *Journal of Corporate Real Estate*, **1**1(4), pp.244 – 254.

PATTON, M.Q., 2002. *Qualitative Research and Evaluation Methods.* 3rd edn. London: Sage Publications.

PARNABY, J., 1995. Systems Engineering for Better Engineering. *Engineering Management Journal,* **5**(6), pp. 256-266.

PEPPER, M.P.J. and SPEDDING, T.A., 2010. The Evolution of Lean Six Sigma. *International Journal of Quality and Reliability Management,* **27**(2), pp. 138-155.

PERROW, C., 1971. *Organizational Analysis: A Sociological View.* London: Tavistock Publications.

PERROW, C., 1967. A framework for the Comparative Analysis of Organizations. *American Sociological Review,* **32**, pp. 194-208.

PETERS, T.J. and WATERMAN, R.H., 1982. *In Search of Excellence.* New York, London: Harper & Row.

PETTIGREW, A.M., 1990. Longitudinal field research on change: Theory and practice. *Organization Science,* **1**(3), pp. 267-292.

PIERCY, N. and RICH, N., 2009. Lean Transformation in the Pure Service Environment: The Case of the Call Service Centre. *International Journal of Operations & Production Management,* **29**(1), pp. 54-76.

PUGH, D.S., HICKSON, D.J., HINNINGS, C.R. and TURNER, C., 1969. The Context of Organization Structures. *Administrative Science Quarterly,* **14**, pp. 91-113.

QUINN, R.E. and ROHRBAUGH, J., 1983. A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach of Organizational Analysis. *Management Science,* **29**, pp. 363-77.

RADNOR, Z., 2010. Transferring Lean into Government. *Journal of Manufacturing Technology,* **21**(3), pp. 411-428.

RITCHIE, J. and LEWIS, J., 2006. *Qualitative Research Practice.* London: Sage.

ROBEY, D., 1991. *Designing Organizations.* 3rd edn. Homewood, IL: Irwin.

ROBEY, D. and SALES, C.A., 1994. *Designing Organisations.* 4th edn. Burr Ridge, IL: Irwin.

ROSSMAN, G.B. and RALLIS, S.F., 1998. Learning in the Field: An introduction to qualitative research.

ROTHER, M., SHOOK, J., WOMACK, J.P. and JONES, D.T., 1998. *Learning to See: Value Stream Mapping to Create Value and Eliminate Muda.* Brookline, Mass.: Lean Enterprise Institute.

ROWLEY, J., 2002. Using Case Studies in Research. *Management Research News,* **25**(1), pp. 16-27.

SAUNDERS, M., LEWIS, P. and THORNHILL, A., 2006. *Research Methods for Business Students.* 4th edn. Essex, England: Pearson Education Limited.

SCHEIN, E., 1999. *Process Consultation Revisited: Building the Helping Relationship.* Reading, MA: Addison-Wesley.

SCHEIN, E.H., 1992. *Organizational culture and leadership.* 2nd edn. San Francisco: Jossey- Bass.

SCHEIN, E.H., 1988. *Organizational Psychology.* 3rd edn. Englewood Cliffs, NJ: Prentice Hall International.

SCHEIN, E.H., 1985. *Organizational Culture and Leadership: A Dynamic View.* San Fransisco: Jossey-Bass.

SCHMIDT, S.M. and CUMMINGS, L.L., 2007. Organizational Environment, Differentiation and Perceived Environmental Uncertainty. *Decision Sciences,* **7**, pp. 447-467.

SCHWANINGER, M., 2009. Complex Versus Complicated: The How of Coping with Complexity. *Kybernetes,* **38**(1/2), pp. 83-92.

SCHWANINGER, M., 2006. Design for Viable Organizations - The Diagnostic Power of the Viable System Model. *Kybernetes,* **35**(7/8), pp. 955-966.

SEKARAN, U., 2003. *Research Methods for Business: A Skill Building Approach.* 4th edn. New York: John Wiley and Sons.

SEKARAN, U., 1992. *Research Methods for Business: A Skill Building Approach.* 2nd edn. New York: John Wiley & Sons, Inc.

SIMMONS, J. and LOVEGROVE, I., 2005. Bridging the Conceptual Divide: Lessons from Stakeholder Analysis. *Journal of Organizational Change Management,* **18**(5), pp. 495-513.

SKYRME, D.J., 1999. *Black Box Knowledge: An Open or Shut Case?* *http://www.skyrme.com* edn.

STALLWORTH JR, O.E. and KLEINER, B. H. 1996. Recent developments in office design, *Facilities*, **1**4(1/2), pp.34 – 42.

STEEN, J., BLOMBERGSSON, M. and WIKLANDER, J. 2005. Useful buildings for office activities, *Facilities*, **2**3(3/4), pp.176 – 186.

STRAUSS, A. and CORBIN, J., 1990. Basics of Qualitative Research: Grounded Theory Procedures and Techniques.

STRONGMAN, K.T. and WOOSLEY, J., 1967. Stereotyped Reactions to Regional Accents. British Journal of Social and Clinical Psychology, 6, pp. 164-167.

STUART, I., 2002. Effective Case Research in Operations Management: A process perspective. Journal of Operations Management, **2**0(5), pp. 419-433.

SUCHMAN, L. and WYNN, E., 1984. Procedures and Problems in the Office. Office: Technology and People, 1, pp. 133-154.

TAPPING, D. and SHUKER, T., 2003. Value Stream Management for the Lean Office: Eight Steps to Planning, Mapping and Sustaining Lean Improvements in Administrative Areas. New York: Productivity Press.

TASHAKKORI, A. and TEDDLIE, C., eds, 2003. *Handbook of Mixed Methods in Social and Behavioral Research.* Thousand Oaks, CA: Sage.

TASHAKKORI, A. and TEDDLIE, C., 1998. *Mixed Methodology: Combining Qualitative and Quantitative Approaches.* Thousand Oaks, CA, London: Sage Publications.

TAYLOR, S.J. and BOGDAN, R., 1984. *Introduction to Qualitative Research Methods: The Search for Meaning.* New York: John Wiley & Sons.

TENNENBAUM, R. and SCHMIDT, W., 1973. *How to Choose a Leadership Pattern. Harvard Business Review*, pp. 163-180.

THIETART, R.A., 2001. *Doing Management Research: A Comprehensive Guide.* London: Sage Publications.

THOMPSON, J., 2000. *Lean Production for the Office: Common Sense Ideas to Help your Office Continuously Improve.* Canada: Productive Publications.

THOMPSON, J., 1997. *The Lean Office: How to Use Just In Time Techniques to Streamline Your Office.* Toronto, Canada: Productive Publications.

THOMPSON, J.D., 1967. *Organizations in Action.* New York: McGraw-Hill.

TIAMIYU, M.A., 1992. *The Relationships Between Source Use and Work Complexity, Decision-Maker Discretion and Activity Duration in Nigerian Government Ministries. International Journal of Information Management,* **1**2, pp. 130-141.

TISCHLER, L., 2006. *Bringing lean to the office. Quality Progress,* **3**9(7), pp. 32-38.

TSICHRITZIS, D., 1986. *Office Automation Tools. In: M. JARKE, ed, Managers, Micros and Mainframes: Integrating Systems for End-Users.* Chichester: Wiley, pp. 11-20.

TULL, D. and HAWKINS, D., 1993. *Marketing Research: Measurement and method: A text with cases.* 6th edn. New Jersey: Prentice Hall.

TURNER, G. and MYERSON, J., 1998. *New Workspace New Culture - Office design as a catalyst for change.* Hampshire, England: Gower Publishing Limited.

TUSHMAN, M.L. and NADLER, D.A., 1978. *Information Processing as an integrating concept in Organizational Design. Academy of Management Review,* 3, pp. 613-624.

VAN DE VEN, A.H., DELBECQ, A.L. and KOENIG, R., 1976. *Determinants of Coordination Modes within Organizations. American Sociological Review,* **4**1, pp. 322-338.

VAN VIJFEIJKEN, H., KLEINGELD, A., VAN TUIJIL, H., ALGERA, J.A. and THIERRY, H., 2006. Interdependence and fit in Team Performance Management. Personnel Review, **3**5(1).

VICTOR, B. and BLACKBURN, R.S., 1987. Interdependence: An Alternative Conceptualization. Academy of Management Review, **1**2(3), pp. 486-98.

VOSS, C., TSIKRIKTSIS, N. and FROHLICH, M., 2002. Case Research in Operations Management. International Journal of Operations & Production Management, **2**2(2), pp. 195-219.

WALLIS, S.E., 2008. Validation of Theory: Exploring and Reframing Popper's Worlds. Integral Review, 4(2), pp. 71-91.

WANG, E.T.G., 2001. Linking Organizational Context with Structure: A Preliminary Investigation of the Information Processing View. Omega - The International Journal of Management Science, , pp. 429-443.

WATERMAN, R.H., PETERS, T.J. and PHILIPS, J.R., 1980. Structure is Not Organization. Business Horizons, **23/**3, pp. 14-26.

WILLIAMS, R., 1998. Performance Management. London: Thompson Business Press.

WOMACK, J.P. and JONES, D.T., 2005. Lean Consumption. Harvard Business Review.

WOODWARD, J., 1965. Industrial Organization: Theory and Practice. Oxford: Oxford University Press.

YIN, R.K., 2009. Case Study Research: Design and Methods. 4th edn. Los Angeles, CA; London: Sage.

YIN, R.K., 2003. Case Study Research: Design and Methods. 3rd edn. London: Sage.

YIN, R.K., 2000. Rival Explanations as an Alternative to "Reforms as Experiments". In: L. BICKMAN, ed, Validity & Social Experimentation: Donald Campbell's Legacy. Thousand Oaks, CA: Sage, pp. 239-266.

ZAMMUTO, R.F., 1984. A Comparison of Multiple Constituency Models of Organizational Effectiveness. Academy of Management Review, 9, pp. 606-16.

Appendix A – Thematic matrix of the pilot study using information gained from the organic office case study to answer research question 2

Codes	Issues Discussed	Basic Themes	Organising Themes
• Importance of relationship with manager • Goal achievement barriers • Co-worker's relationships • Decision making • Tasks description • Unimportant routine tasks	• Having regular meetings with supervisor • Asking supervisor when help is needed • Coordinating with supervisor using unofficial meetings • Employee coordinates the work by self-driving the research • Reaching consensus using mutual adjustments • Prioritise jobs by putting routine work towards the bottom • Using an overall plan • Face to face discussion with other colleagues • Unexpected results & complex tasks with high variety	• Differentiation / Integration • Coordination • Organic / Mechanistic nature	**1. How to organise activities / actors?**
• Relationship with manager • Importance of relationship with manager • Goal achievement barriers • Job requirements	• Frequency of work related interaction with manager • Supervisor provides technical advice & funding • Supervisor gives personal help • Importance of having personal and emotional help from the environment • Followers voluntarily arrange for unofficial meetings with manager if help is needed	• Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level	**2. Leadership style adopted?**
• Job requirements • Tasks description • Job aim	• software used • work is split into work packages & the way used to achieve aim is flexible, variable & feedback dependant • You start doing an initial job and all jobs will follow all the way until you finish PhD • You cannot start next phase and know detail about it until you finished and got feedback on previous one	• Technology systems used • Thompson's technology type	**3. Technology characteristics needed**
• Characteristics of goals • Outcome Requirements • Goal achievement barrier	• Emphasis on creativity • Publishable quality • Learning • Congruency of tasks with objectives • They take new direction based on group consensus	• Shared values • Competing Values Framework (Flexible / focused dimension &	**4. Organisational culture characteristics needed?**

Codes	Issues Discussed	Basic Themes	Organising Themes
• Task description • Job requirements • Co-workers relationships • Job aim	• Importance of having an environment that give the right supportive conditions • Seeking help from co-workers when needed • Having skills to both know various ways for carrying out the objectives and assessing these ways • Flexibility in achieving objectives • Focus on various way to achieve objectives • Focus on issues related to tasks	External / internal dimension)	
• Relationship with manager • Importance of relationship with manager • Co-workers relationships • Working independently • Task description	• Interaction with supervisor • Unimportance of daily interaction with colleagues • Occasional interaction with colleagues when help is needed • Most of the work is done individually • Unpredictability of the results • Variability in achieving the aim • Change nature of the planned subsequent tasks identified initially • Overall structure of research can be identified without much detail	• Thompson's interdependence • Task Uncertainty	**5. Choice of work unit planning?**
• Job aim • Task description • Importance of relationship with manager • Characteristics of goals • Goal achievement barriers	• Defending his written thesis & being rewarded with a PhD degree • Group meeting including supervisor to assess and take strategic decisions • Evaluate weekly/biweekly progress with supervisor and be rewarded with acknowledgements or constructive feedback. • Having predefined goals and objectives • Work is split into packages then aim is achieved flexibly • Tasks are congruent with the objectives of research • Having weekly/biweekly targets submitted to supervisor • Overcoming barriers of achieving goals	• Management control system/Reward system • Business strategy / organisational effectiveness	**6. How to assess individuals?**
• Tasks description • Characteristics of goals	• Unexpected results & complex tasks with high variety • Achieving the project objectives creatively	• Organic / mechanistic nature • Creativity	**7. Employees' support needed?**

Codes	Issues Discussed	Basic Themes	Organising Themes
• Job aim	• The job is about novelty & originality • Several options with various degrees of complexity arise due to the unexpected nature of the job • We can identify overall structure without much detail due to high uncertainty and complexity • When people succeed in their PhD, they leave the office • Having participative leadership by group consensus • Task uncertainty, skill set, discretion & reward system were discussed in various key statements	• Task complexity • History of the office • Job satisfaction • Weak / strong situation	

Appendix B – Thematic matrix of the pilot study using information from the mechanistic office case study to answer research question 2

Codes	Issues Discussed	Basic Themes	Organising Themes
• Specialties • Job requirements • Tasks description • Surroundings description • Co-worker's relationships • Job aim	• Employees are differentiated in terms of specialties • Getting answers quickly from other employees • Employees draw on each other's experience by being close & using teamwork • Do seasonal jobs (i.e. archiving) by acting as a team • Each employee is assigned with a task • Resources are coordinated in a first come / first serve basis • Prioritising work • Having a daily procedure for dealing with website enquires • Dealing with the counter in a rota basis • Face-face interaction with customers • How most tasks are predictable, divisible & with limited variety	• Differentiation / Integration • Coordination • Organic / Mechanistic nature	1. **How to organise activities / actors?**
• Job requirements	• Occasionally manager advices on certain financial matters • Manager encourages workers to know about each other's work as it helps in covering for them if they are absent • People have broad knowledge, which help them answer each other's questions quickly and effectively • People support each other by covering for each other when someone is absent	• Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level	**2. Leadership style adopted?**
• Change • Tasks description • Customer relationships • Co-workers	• New financial software installed • basic communication equipment used • Specialist who works in parallel	• Technology systems used • Thompson's technology type	**3. Technology characteristics needed**

Codes	Issues Discussed	Basic Themes	Organising Themes
relationships • Specialities	• Describes the flow & sequence of steps for processing card payments • Described manor of working in a rota basis to do the counter		
• Change • Job requirements • Outcome requirements • Co-workers relationships • Customers of the office	• Being flexible • Accuracy & speed • Professional & provide high level of service • Looking after the students, protecting their privacy & treat them with respect • The substantial knowledge that people have makes them help each other quickly & effectively • Team work interaction between various specialists in the office • Flexibility of working methods due to installation of new software • High skill set to provide flexibility in covering each other's jobs • Majority of interaction is with external customers & clients	• Shared values • Competing Values Framework (Flexible / focused dimension & External / internal dimension)	**4. Organisational culture characteristics needed?**
• Specialties • Task description • Customer relationships	• Each worker is assigned with a specialist task • Sequence and steps of the various tasks carried out • Nature of interaction with others • Drawing on each other's skills while doing rota & archiving • Tasks are predictable • Not knowing what questions are going to be asked by students	• Thompson's interdependence • Task Uncertainty	**5. Choice of work unit planning?**
• Importance of relationship with manager • Outcome requirements • Job requirements • Job aim	• The manager keeps an eye on them and acknowledge them • Daily reconciliation • Work assess for errors • Manager evaluates them in terms of their output & their behaviour, then give them a positive/negative feedback • The main goal is to settle accounts & everything else is secondary	• Management control system/Reward system • Business strategy / organisational effectiveness	**6. How to assess individuals?**
• Tasks	• How most tasks are	• Organic /	**7. Employees'**

Codes	Issues Discussed	Basic Themes	Organising Themes
Description • Job requirements • Efficiency	predictable, divisible & with limited variety • Described most tasks to have an element of a flow due to its predictability, divisibility & limited variety • The people have been in the office for a while (i.e. fifteen years) • Recently reduced the number of staff to run more efficiently • People feel confident with their skill & level of support given by other co-workers & the manager • Employees confidently depend on others & trust them to do their job for them in their absence • Task uncertainty, skill set, discretion & reward system were discussed in various key statements	mechanistic nature • Task complexity • History of the office • Job satisfaction • Trust • Weak / strong situation	**support needed?**

Appendix C – Pilot study cross case thematic matrix to answer research question 2

Case study	Issues Discussed	Basic Themes	Common Organising Themes
Research office – Organic office	• Having regular meetings with supervisor • Asking supervisor when help is needed • Coordinating with supervisor using unofficial meetings • Employee coordinates the work by self-driving the research • Reaching consensus using mutual adjustments • Prioritise jobs by putting routine work towards the bottom • Using an overall plan • Face to face discussion with other colleagues • Unexpected results & complex tasks with high variety	• Differentiation / Integration • Coordination • Mechanistic / organic nature	
Finance office – Mechanistic office	• Employees are differentiated in terms of specialties • Getting answers quickly from other employees • Employees draw on each other's experience by being close & using teamwork • Do seasonal jobs (i.e. archiving) by acting as a team • Each employee is assigned with a task • Resources are coordinated in a first come / first serve basis • Prioritising work • Having a daily procedure for dealing with website enquires • Dealing with the counter in a rota basis • Face-face interaction with customers • How most tasks are predictable, divisible & with limited variety	• Differentiation / Integration • Coordination • Mechanistic / organic nature	1. **How to organise activities / actors?**
Research office – Organic office	• Frequency of work related interaction with manager • Supervisor provides technical advice & funding • Supervisor gives personal help Importance of having personal and emotional help from the environment • Followers voluntarily arrange unofficial meetings with manager if help is	• Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level	2. **Leaders hip style adopted?**

Case study	Issues Discussed	Basic Themes	Common Organising Themes
	needed		
Finance office – Mechanistic office	• Occasionally manager advices on certain financial matters • Manager encourages workers to know about each other's work as it helps in covering for them if they are absent • People have broad knowledge, which help them answer each other's questions quickly and effectively • People support each other by covering for each other when someone is absent	• Leader / follower task behaviour • Leader / follower relationship behaviour • Follower readiness / maturity level	
Research office – Organic office	• software used • work is split into work packages & the way used to achieve aim is flexible, variable & feedback dependant • You start doing an initial job and all jobs will follow all the way until you finish PhD • You cannot start next phase and know detail about it until you finished and got feedback on previous one	• Technology systems used • Thompson's technology type	**3. Technology characteristics needed**
Finance office – Mechanistic office	• New financial software installed • basic communication equipment used • Specialist who works in parallel • Describes the flow & sequence of steps for processing card payments • Described manor of working in a rota basis to do the counter	• Technology systems used • Thompson's technology type	
Research office – Organic office	• Emphasis on creativity • Publishable quality • Learning • Congruency of tasks with objectives • They take new direction based on group consensus • Importance of having an environment that gives with the right supportive conditions • Seeking help from co-workers when needed • Having skills to both know various ways for carrying out the objectives and assessing these ways • Flexibility in achieving objectives • Focus on various ways to achieve objectives • Focus on issues related to tasks	• Shared values • Competing Values Framework (Flexible / focused dimension & External / internal dimension)	**4. Organisational culture characteristics needed?**
Finance office – Mechanistic office	• Being flexible • Accuracy & speed • Professional & provide high level of service • Looking after the students, protecting their privacy & treat them with respect	• Shared values • Competing Values Framework (Flexible / focused dimension & External / internal	

Case study	Issues Discussed	Basic Themes	Common Organising Themes
	• The substantial knowledge that people have makes them help each other quickly & effectively • Team work interaction between various specialists in the office • Flexibility of working methods due to installation of new software • High skill set to provide flexibility in covering each other's jobs • Majority of interaction is with external customers & clients	dimension)	
Research office – Organic office	• Interaction with supervisor • Unimportance of daily interaction with colleagues • Occasional interaction with colleagues when help is needed • Most of the work is done individually • Unpredictability of the results • Variability in achieving the aim • Change nature of the planned subsequent tasks identified initially • Overall structure of research can be identified without much detail	• Thompson's interdependence • Task Uncertainty	**5. Choice of work unit planning ?**
Finance office – Mechanistic office	• Each worker is assigned with a specialist task • Sequence and steps of the various tasks carried out • Nature of interaction with others • Drawing on each other's skills while doing rota & archiving • Tasks are predictable • Not knowing what questions are going to be asked by students	• Thompson's interdependence • Task Uncertainty	
Research office – Organic office	• Defending his written thesis & being rewarded with a PhD degree • Group meeting including supervisor to assess and take strategic decisions • Evaluate weekly/biweekly progress with supervisor and be rewarded with acknowledgements or constructive feedback. • Having predefined goals and objectives • Work is split into packages then aim is achieved flexibly • Tasks are congruent with the objectives of research • Having weekly/biweekly targets submitted to supervisor Overcoming barriers of achieving goals	• Management control system/Reward system • Business strategy / organisational effectiveness	**6. How to assess individuals?**
Finance office – Mechanistic	• The manager keeps an eye on them and acknowledge them • Daily reconciliation	• Management control system/Reward	

Case study	Issues Discussed	Basic Themes	Common Organising Themes
office	• Work assess for errors • Manager evaluates them in terms of their output & their behaviour, then give them a positive/negative feedback • The main goal is to settle accounts & everything else is secondary	system • Business strategy / organisational effectiveness	
Research office – Organic office	• Unexpected results & complex tasks with high variety • Achieving the project objectives creatively • The job is about novelty & originality • Several options with various degrees of complexity arise due to the unexpected nature of the job • We can identify overall structure without much detail due to high uncertainty and complexity • When people succeed in their PhD, they leave the office • Having participative leadership by group consensus • Task uncertainty, skill set, discretion & reward system were discussed in various key statements	• Organic / mechanistic nature • Creativity • Task complexity • History of the office • Job satisfaction • Weak / strong situation	**7. Employees' support needed?**
Finance office – Mechanistic office	• How most tasks are predictable, divisible & with limited variety • Described most tasks to have an element of a flow due to its predictability, divisibility & limited variety • The people have been in the office for a while (i.e. fifteen years) • Recently reduced the number of staff to run more efficiently • People feel confident with their skill & level of support given by other co-workers & the manager • Employees confidently depend on others & trust them to do their job for them in their absence • Task uncertainty, skill set, discretion & reward system were discussed in various key statements	• Organic / mechanistic nature • Task complexity • History of the office • Job satisfaction • Trust • Weak / strong situation	

Appendix D – Organic case study database used in the pilot study

Date	Description	Format	Source	Role
5/5/2005	Transcripts of semi-structured interview with supervisor	Recorded digitally	Supervisor	Supervisor of various researchers in the office
5/5/2005	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
6/5/2005	Transcripts of semi-structured interview with employee number 1	Recorded digitally	Regular employee of the office – Respondent 1	Researcher in the office
10/52005	Transcripts of semi-structured interview with employee number 2	Recorded digitally	Regular employee of the office – Respondent 2	Researcher in the office
13/5/2005	Transcripts of semi-structured interview with employee number 3	Recorded digitally	Regular employee of the office – Respondent 3	Researcher in the office
17/5/2005	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	

Appendix E – Mechanistic case study database used in the pilot study

Date	Description	Format	Source	Role
2/6/2005	Transcripts of semi-structured interview with manager	Recorded digitally	Manager of the office	Finance office Manager
2/6/2005	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
3/6/2005	Transcripts of semi-structured interview with employee number 4	Recorded digitally	Regular employee of the office – Respondent 4	Accountant in the office
7/6/2005	Transcripts of semi-structured interview with employee number 5	Recorded digitally	Regular employee of the office – Respondent 5	Accountant in the office
10/6/2005	Transcripts of semi-structured interview with employee number 6	Recorded digitally	Regular employee of the office – Respondent 6	Accountant in the office
14/6/2005	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
30/6/2005	Transcripts of semi-structured interview – Further collection of qualitative data was needed from employee number 4	Recorded digitally	Regular employee of the office – Respondent 4	Accountant in the office
30/6/2005	Transcripts of semi-structured interview – Further collection of qualitative data was needed from employee number 5	Recorded digitally	Regular employee of the office – Respondent 5	Accountant in the office
30/6/2005	Transcripts of semi-structured interview – Further collection of qualitative data was needed from employee number 6	Recorded digitally	Regular employee of the office – Respondent 6	Accountant in the office

Appendix F – Case study protocol of the pilot study

Introduction to Case Study

The Pilot Study Phase Rationale

The literature strongly suggested that offices and their organisational design have been receiving little attention by organisations as most literature focused on office dimensions such as ergonomics and office physical design. Piercy and Rich (2009) argue that there is evidence suggesting that service businesses are, in practice, failing on both customer demands for better quality of service and managerial demands for cost reduction. Thompson (1997) and Tapping and Shuker (2003) argue that manufacturing companies tend to concentrate on having competitive advantage through enhancing the manufacturing processes whilst often overlooking office domains as a source of competitive advantage. Radnor argues that the development and application of lean tools and techniques within the service sectors (e.g. the public sector) are still under researched (Radnor 2010). Whilst Emiliani argues that the application of lean tools and techniques has been limited to certain office types/parts (Emiliani 2007a).

This indicated the need to develop a method for improving the design of the management systems of offices to make them more effective and leaner. This research also aims to identify the reasons why lean, in non-manufacturing areas, has been underdeveloped and has been facing various limitations. A critical review of the literature identified that Value Stream Mapping has been used to map mechanistic task activities, however, Magnusen argues that offices are a mix of organic and mechanistic tasks (Robey 1991, Mullins 2007). This prompted the need to both create a new generation of Value Stream Mapping to map organic task activities and redesign offices whilst considering the existence of a realistic mix between organic and mechanistic tasks. Various office management systems, variables and tools (e.g. task uncertainty, interdependence, task complexity, mechanistic / organic

structures, risk, task analysability… etc) were used to help the analyst more comprehensively understand offices in order to better redesign them. This list of variables was initially identified by carrying out a literature review. The aim of this pilot study phase is to confirm and complement the findings of the literature review by carrying out an empirical pilot study phase. These findings are then to be used to formulate the conceptual model of this study which is in the form of a set of guidelines to redesign offices.

The Objectives of the Pilot Study Phase

The objectives of conducting this empirical pilot study phase are:

• To complement the list of variables needed to characterise offices which were identified from the literature review. This is done by carrying out an empirical pilot study phase.

• To identify the main themes of the office needed to represent its various management systems with the aim of redesigning/diagnosing the office.

Chosen Case Studies

Since this study was exploratory a multi-case strategy was considered to provide greater understanding of the phenomenon. The strategy used to select the cases involved the use of two polar types of case studies that were opposite in their characteristics such as mechanistic and organic systems. A finance office that was predominantly exhibiting mechanistic characteristics was chosen to represent mechanistic offices whilst a research office that was predominantly exhibiting organic characteristics was chosen to represent organic offices. The two case study offices about to be investigated were based in the England, UK which was not considered to be an issue of concern whilst selecting the research sites or assessing the findings.

Case Study Questions

Research Question 1 (RQ1): What is the list of variables needed to characterise offices and the design of its various management systems?

Research Question 2 (RQ2): What are the main office management systems needed to redesign an office?

Data Collection and Field Procedures

Initial Contact Person

Access was arranged through two established contacts. Each contact in each research site was also involved in introducing my research to other workers in the office. This was followed by an explanation of the problems to be studied and the development of a case study design with the workers of the office. Getting approval from the workers of each office, provided entrance to the sites, helped in locating people for additional information and assistance, helped in carrying out the interviews as well as observations and helped in identifying aspects to study and focus on during the interviews.

Main Study

Research sites visits (3-5 visits) were arranged for each research site, based on the availability of the employees in the research sites for an average of two months. The data collection techniques used were:

- Non participative direct observation took place for each office in unstructured way. This was done after finding out from the gatekeepers of each office the most appropriate time, when all employees were present and working under regular conditions.

- Interviews by selecting interviewees according to the job roles of interest. These job roles were communicated to the gatekeepers who selected the needed individuals. Semi-structured interviews were used for exploring how offices were characterised in terms of their management systems. These interviews were in-

depth and semi-structured in the form of guided conversation which aimed to explore as many issues as possible.

Information Sought	Projected Outcomes	Applicable to
Characteristics of offices and the tasks used to implement the roles of various workers in the office • What are the characteristics of the office management systems? • What are the main variables used to describe office tasks? • What are the main management systems of an office?	To identify any variables used, by various employees of the two offices, to explain how offices and their management systems are characterised and perceived.	• Employees of each office
Important issues related to the execution of jobs in offices • What is important while carrying out the job and its tasks?	To fully capture any important issues or variables related to offices by various employees.	• Employees of each office
Unimportant issues related to the execution of jobs in offices • What is unimportant while carrying out the job and its tasks?	To understand if there are any issues that does not receive a great deal of attention by various employees of the two research sites.	• Employees of each office.

Data Sources

A data table was constructed to identify the precise source of information from each research site required to answer the research questions and gather the required information. This data table was given to the gatekeepers at each research sites to ensure that the people would be capable of giving the information needed.

Data set	Research Office	Finance Office	Outcomes	Research Question
Interviews	Employee 1	Employee 4	To empirically identify the list of variables needed to characterise offices and the design process of their management systems. In addition to identify the main themes of the office needed to characterise offices and the design process of their management systems	RQ1,RQ2
	Employee 2	Employee 5	To empirically identify the list of variables needed to characterise offices and the design process of their management systems. In addition to identify the main themes of the office needed to characterise offices and the design process of their management systems	RQ1,RQ2
	Employee 3	Employee 6	To empirically identify the list of variables needed to characterise offices and the design process of their management systems. In addition to identify the main themes of the office needed to characterise offices and the design process of their management systems	RQ1,RQ2
Direct Observation		Interaction with customers	Understanding the nature of interaction with customers, the factors considered while handling them, and the procedures followed or carried out to handle their query.	RQ1,RQ2
	Physical environment	Physical environment	Understanding the physical layout of the office, any physical restrictions, the technology systems used and any employees surveillance used,	RQ1,RQ2
	General atmosphere	General atmosphere	Number of people, understanding interactions among individuals, managers' visits and their activities during the visits, the rules and procedures, the frequency of the interaction between others, the interdependence between them, if they communicate with each other in a formal or informal way, and if the work atmosphere is stressful or pleasant.	RQ1,RQ2

Outline of Case Study Report

Data Analysis Methodology

Thematic analysis was used as an inductive strategy to analyse the qualitative interview data and identify the emerging patterns/themes. The results from interviews were directly compared with results from observations. Pattern matching advocated by Yin (2003) was used to find out if the findings from the literature review were compatible with the findings from the themes emerging from the case studies. This was done by utilising Miles and Huberman (1984) tabular analysis as supporting evidence. Thereafter, further thematic analysis was carried out in order to identify the

organising themes (i.e. main themes) that can be used to characterise offices and their management systems. Then, cross case analysis was conducted to identify the common themes. Subsequently, these common themes were then expanded and linked to the literature. Afterwards, these common themes were used to build a conceptual model for this study which also utilised a mind map of the causal relationships between the common themes and other variables as suggested from the literature.

Write-up Format

Each individual case was presented by itself. Cross-case analysis of the findings of the cases was then carried out in a less detailed way to provide insight about the list of variables used to characterise offices in each case study. A discussion about variables that commonly emerged in both case studies was carried out. This involved a discussion about the variables that were visible in one case study but not the other. It also involved a discussion about the variables that were not visible to the respondents of both case studies but emerged through direction observations or cited literature.

Appendix G – Pilot study interview protocol completed by the employees of each office

Below is an example of an interview protocol completed by respondent 4 of the mechanistic office:

Manufacturing Organisation Research Group, Loughborough,
Wolfson School of Mechanical and Manufacturing Engineering

Pilot Studies Interview Protocol – Office Employees

(Answers of Respondent 4 of the Finance Office)

Part Two

Name of the office and organisation	Finance office – Loughborough University
Contact person(s)	Respondent 4 – Senior Income Assistant
Phone:	Confidential
Email:	Confidential

Seiam Alfadhl
Research Student
Wolfson School of Mechanical & Manufacturing Engineering
Loughborough University
Loughborough
Leicestershire
LE11 3TY

Additional Contact Information:
Mobile: 07816339623
S.S.Alfadhl@lboro.ac.uk

Where necessary additional space is available for further information at the rear

Aim

The aim is to identify the predominant trend within this office in terms of two types of tasks. The first type is the simple routine tasks with low level of variety and predictable nature. The second type is the complex non-routine tasks with high level of variety and unpredictable nature. Based on this, the aim is to understand the nature of this office by identifying what part of the office tasks relates to the repetitive routine tasks type and what part relates to the non-routine type.

Questions

Please answer the following questions:

1. Describe how you carry out your job and tasks in this office?

Interviewee Answer:

"We have one manager and nine staff with the right combination… basically my job is varied, it gets interrupted by other colleagues questions they need… because we are quite specialist in our areas of expertise, we got somebody that deals with student fees, somebody that deal with accommodation fees, I deal with direct debt, cashiers, and debt collectors. So you can be asked any question from any one of those at any point during the day... we mainly deal with international as well as home students, staff from other departments, parents of students, external companies and outside organisation… huge variety of professionals…

The phone may ring... so you just quite do not know who is going to be in the other end of the line.... it could be a student, a parent, a sponsor... there is a huge variety in what I do because I deal with students and departments, the queries from the students are generally the same thing... but the departments ones are more varied... so I might get a call from a department about a conference they are running and the delegate might want to know how they can pay... so this is not student related at all...however, I think it's quite routine... it could be jobs that needed to be done once a month or once a week.... ".

I don't think that there are steps to every task I do.... my title is direct debit administrator... in about 75% of my tasks, I set up the direct debit paper work for the student to complete and receiving it back in, setting it up in their account, sending out the payment schedule, telling them when money will be taken out... so there is an element of a flow, which is very predictable and divisible into smaller tasks with limited variety in chosen tasks.

The other task is to process card payments on behalf of conference delegates, I process the payment on behave of departments, which is for a lot of departments... and that can be quite busy as well... there is really an element of flow to this, the delegate will complete the registration paper work and send that to the department to process it and register them on the course, and then the department will send the paper work to me to process the paper work. And as long as the payment goes in successfully that's where my role ends... so I just process payments in their behalf because other departments don't have credit card machines... again that's done in the same sort of predictable flow, which is divisible and have low variety. Those two are about 15%.

Occasionally, in 10% of other tasks... students cancel direct debit, change payment method or their account is not up-to-date with required payments... so there is ongoing maintenance and that can be varied with high variety, unlike the other two

main tasks... depending on the reason, the action you take to correct the account can be different sometimes resulting in communication between the student and the bank or different departments to find out the amount of money due
We just had a new finance system installed, which meant major changes to everybody, so we had to change to follow the new procedures of the system…Luckily, our working methods are flexible to move with the time
The manager keeps an eye on how everyone is doing, so you will be acknowledged when you do well or work long hours".

2. What do you think is important while carrying out your job?
Interviewee Answer:
"I think that accuracy is essential, and speed because we have tight deadlines… So it has to be done quickly while maintaining the accuracy…
I think it is important to have the correct resources to perform the tasks that you do, were the equipment that you use is not occupied by other colleagues without having to wait long for your turn, or that the contact information are available... you need to be sure that you are doing your job properly... if it's a specific job, you need to be very concentrated... because we are an open office... and it can get noisy in here at times, when you are trying to concentrate on that moment in time...
Luckily in the job I do, it is very important to communicate with others... the people that have certain roles have been here for a while.... so I have been here for fifteen years and there is a lot of long servants in the office and over the years you build your knowledge quite substantially... this is important, because when you have a broad knowledge, then you can answer the questions quite quickly and effectively, and when we have the right knowledge then we can train people well because of the knowledge we have... however, very occasionally the manager may need to help in certain financial areas if we need any…
Also, if there is any one sick then someone can do their job in their absence, because we know a little bit about each other's jobs and its quite nice to have people who can cover you, because you will feel confident while you are at home sick that your job is going to be done. This makes you feel that you are being supported in a rather personal level, especially that the manager encourages that.

3. What do you think is not important while carrying out your job?
Interviewee Answer:
"I consider anything to be important in my job... every aspect is important.... I think it is not important for others, when you take a pride in your work such as keeping your office tidy... but for me it is very important, because, if I got tidy surrounding then I can have a tidy and organised mind... it helps me to think clearly and be more organised and to be able to prioritise my work... because I do have tight deadlines... Maybe what is happening in the outside... your personal life... Do not bring it to work! You are there to do your job and you have to do it well... So you keep your personal life at home".

Appendix H – Initial interview protocol, completed by the manager of each office, used to determine the suitability of the office for further case study

Manufacturing Organisation Research Group, Loughborough,
Wolfson School of Mechanical and Manufacturing Engineering

Interview Protocol Used for Initial Interview with Office Manager of any Case Study Used

Part One

Name of the office and organisation	
Contact person(s)	
Phone:	
Email:	

Seiam Alfadhl
Research Student
Wolfson School of Mechanical & Manufacturing Engineering
Loughborough University
Loughborough
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LE11 3TY

Additional Contact Information:
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Where necessary additional space is available for further information at the rear

Aim

The aim is to identify the predominant trend within this office in terms of two types of tasks. The first type is the simple routine tasks with low level of variety and predictable nature. The second type is the complex non-routine tasks with high level of variety and unpredictable nature. Based on this, the aim is to understand the nature of this office by identifying what part of the office tasks relates to the repetitive routine tasks type and what part relates to the non-routine type.

Background **Definitions**

- <u>An office:</u> It is a semi-autonomous accountable human group working together with some form of interdependence between them as an organisation both distinct from and a part of the company itself, therefore, the office is possibly part of a larger department, which may be within an even larger organisation that has individuals who work towards a common goal.
- <u>Task activity:</u> It has been defined in this study as a collection or a group of activities that are part of the value stream. In this sense, an office is regarded as a collection of task activities that are carried out by its individuals and are part of the value stream of the organisation. Exemplars of various task activities are taking a particular type of customer order, processing payments etc.
- <u>Tasks type (A):</u> It is the tasks that are repetitive and/or routine. They tend to be simple, predictable with low variety and have a nature of a flow.
- <u>Tasks type (B):</u> It is the tasks that are complex and knowledge intensive. They require a skilful employee to cope with its unpredictable nature.

A distinction between the tasks type (A) and tasks type (B) is shown in Table (H.1).

Table (H.1) illustrates a distinction between tasks that are type (A) and tasks that are type (B).

Type (A) Tasks Characteristics	Type (B) tasks characteristics
Simple tasks	Complex tasks
Low variety and repetitive and routine	High variety and requires high skills
Predictable nature	Unpredictable nature

*Question***:**

Imagine that your office consists of various task activities. Could you classify each one of these task activities in term of part (A) tasks and part (B) tasks? What is the percentage of each type in relation to the rest of the tasks of the office?

Appendix I – Explanation of the symbols used within the new generation of Value Stream Mapping

☐ Information box represents an activity or subtask, time, employees

☐ A box showing the Provider and consumer Department

■ Black box represents tasks whose time or details of how it can be done is not clear because of its high uncertainty content, low analysability and as a result high variety and task complexity. The concept of black box is used to represent these complex tasks inner workings are unknown, because, there are high variety level that requires human discretion to choose best alternatives for completing the tasks.

—— Information flow via direct (face-face) contact - (leads to waste of moving)

– – – Information flow via indirect contact, such as internet, phone…etc

Boxes with blue text represent the Processing Time for every operation. This time might be exact or ranges between two values. (1 day = 7.4 hours)

Boxes with red text represent the person(s) that is involved in carrying out the activity.

Communication by internet /online meeting/email

Communication by phone/fax

Communication by face-face team based meeting

Communication by SAP

Appendix J – Model testing interview protocol completed by the manager of the Rolls Royce office

Below is an example of an interview protocol completed by the manager of the Rolls

Royce office while testing the model:

Manufacturing Organisation Research Group, Loughborough,
Wolfson School of Mechanical and Manufacturing Engineering

Rolls Royce Case Study Interview Protocol to Test the Model– Office Manager

Case Study Two

Name of the office and organisation	Exostar Team, e-procurement Department, Rolls Royce
Contact person(s)	Confidential
Phone:	Confidential
Email:	Confidential

Seiam Alfadhl
Research Student
Wolfson School of Mechanical & Manufacturing Engineering
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Loughborough
Leicestershire
LE11 3TY

Additional Contact Information:
Mobile: 07861378857
S.S.Alfadhl@lboro.ac.uk

Where necessary additional space is available for further information at the rear

Aim

The aim is to populate the model shown in Figure (J.1) using this case study. This model is related to redesigning and diagnosing the management systems of your office. This test is carried out to examine if the model practically generates new design recommendations or not.

Background Definitions

• An office: It is a semi-autonomous accountable human group working together with some form of interdependence between them as an organisation both distinct from and a part of the company itself, therefore, the office is possibly part of a larger department, which may be within an even larger organisation that has individuals who work towards a common goal.

• Task activity: It has been defined in this study as a collection or a group of activities that are part of the value stream. In this sense, an office is regarded as a collection of task activities that are carried out by its individuals and are part of the value stream of the organisation. Exemplars of various task activities are taking a particular type of customer order, processing payments etc.

The Model of this Study

Figure (J.1) shows the steps of the model which will be tested using this case study.

Variables (A): variables identified initially from the office current state to initiate the process (e.g. organisational culture, heterogeneity, stakeholders' expectations, skill set, financial restrictions, constraints of office layout, structure, task complexity, leadership style, organisational effectiveness and business strategy) — **STAGE 1**

Identify all the task activities of the office — **STAGE 2**

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively — **STAGE 3**

Evaluate the perceived uncertainty of each task activity — **STAGE 4**

Evaluate the perceived task analysability of each task activity — **STAGE 5**

Identify the type of each task activity carried out in the office – mechanistic or organic task activity — **STAGE 6**

Divide each task activity type in terms of mechanistic or organic — **STAGE 7**

Divide each organic task activity in terms of risk level, this may include: 1) Mechanistic task activities. 2) High risk organic task activities. 3) Low risk organic task activities. — **STAGE 8**

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for mechanistic tasks and high risk organic tasks. 2) Organic system design for low risk organic tasks — **STAGE 9**

Variables (B): variables identified from the characteristics of the method used to produce the output of each task activity such as technology & interdependence. They are identified for each task activity of each system design — **STAGE 10**

For task activities of mechanistic flow system design | *For task activities of organic system design*

Mechanistic flow system design	Organic system design	Stage
Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event	**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**	**STAGE 11**
Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set	**Variables (C):** variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set – each value stream map is labelled with both weak or strong & any stakeholders' expectations	**STAGE 12**
Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**	**STAGE 13**
Define future state characteristics of variables (B) needed to develop the method used to produce the output of each task activity – Team Event	**Define future state characteristics of variables (B) needed to develop the method used to produce the output of each task activity – Team Event**	**STAGE 14**
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**	**STAGE 15**
Define future state characteristics of variables (A)	**Define future state characteristics of variables (A)**	**STAGE 16**
Draw future state maps of each task activity drawn in stage 11 using the conventional form of value stream mapping – Team event	**Draw future state maps of each task activity drawn in stage 11 using the new form of value stream mapping – Team event**	**STAGE 17**
Define future state characteristics of variables (C) for each of the task activities of stage 12	**Define future state characteristics of variables (C) for each of the task activities of stage 12**	**STAGE 18**
Prepare a table listing design recommendations for the office manager in terms of the office seven systems	**Prepare a table listing design recommendations for the office manager in terms of the office seven systems**	**STAGE 19**
Continuous Improvements – Draw future Value Stream Maps as needed	**Continuous Improvements – Draw future Value Stream Maps as needed**	**STAGE 20**

Questions

1. Please indicate using the scale provided below the number of different markets that your office serves (Stage 1 / Heterogeneity)
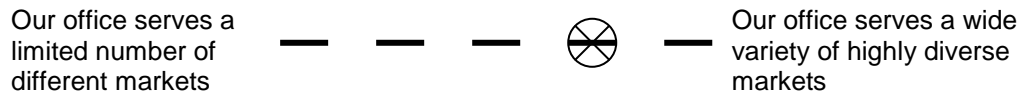
Our office serves a limited number of different markets — — — ⊗ — Our office serves a wide variety of highly diverse markets

The two conditions used to analyse the response given using this scale:

    A. <u>If the manager perceives the markets of the office to be heterogeneous and closer towards the right end of the scale, it means that there are differences in competitive tactics, product lines, customer tastes, channels of distribution, etc across the company's respective markets </u>(Miller, Friesen 1984).

    B. <u>If the manager perceives the markets of the office to be not heterogeneous (i.e. homogeneous) and closer towards the left end of the scale, it means that there are no differences in competitive tactics, product lines, customer tastes, channels of distribution, etc across the company's respective markets </u>(Miller, Friesen 1984).

2. Different individuals and groups in the office may have a different category of an employees' readiness level. Readiness level is defined as the degree to which the followers have the willingness and ability to achieve a particular task and it is not related to his/her personal attributes (Mullins 2007, Hersey, Blanchard et al. 2008). Table (J.1) shows the four different classifications of the readiness level; could you specify the types of readiness levels that exist in your office as shown in Table (J.1)? (Stage 1 / Leadership style – Readiness level)

Table (J.1) illustrates the various levels of readiness of the followers.

Readiness Level	
R1 – Low follower readiness	Relates to followers who are both **unable & unwilling** & who lack motivation & commitment; **OR** who are **unable & insecure**
R2 – Low to moderate follower readiness	Relates to followers who are **unable but willing** & who lack ability but are motivated to make an effort; **OR** who are **unable but confident**
R3 – Moderate to high follower readiness	Relates to followers who are **able but unwilling**, & who have the ability to execute but unwilling to apply their ability; **OR** who are **able but insecure**
R4 – High follower readiness	Relates to followers who are both **able and willing** and who have the ability and commitment to execute; **OR** who are **able and confident**

Source: inferred from (Mullins 2007).

"Basically, in this office we have mainly R4 followers who can handle any project type."

3. Four leadership styles (S1, S2, S3 & S4) with various high / low levels of both task behaviour and relationship behaviour are exhibited by the manager of the office to lead the various employee types of the office. These leadership styles are shown in Table (J.2). Referring to Table (J.2) could you specify the types of the leadership style(s) used by the manager to lead the various employees of the office? (Stage 1 / Leadership style)

Table (J.2) illustrates the various styles of situational leadership.

Leadership Style	Characteristics of Leadership Style
S1 – Telling Style	Task Behaviour (↑) & Relationship Behaviour (↓)
S2 – Selling Style	Task Behaviour (↑) & Relationship Behaviour (↑)
S3 – Participating Style	Task Behaviour (↓) & Relationship Behaviour (↑)
S4 – Delegating Style	Task Behaviour (↓) & Relationship Behaviour (↓)
Definitions	
Task Behaviour: It is the amount of guidance or direction a leader gives to the subordinates by setting up goals for them and defining their roles and how to perform them (i.e. telling them what to do, when to do it and how to do it).	
Relationship behaviour: It is also called supportive behaviour; It is the amount of social backup a leader gives to the subordinates in a two-way communication, by listening to them and offering them support and encouragement.	

Source: inferred from (Mullins 2007, Huczynski, Buchanan 2007).

"I think it is more like S3 - participating style, because I give them support in terms of relationship behaviour and the sponsor (i.e. mentor) gives us the task behaviour"

4. Could you list any major stakeholders who influence the office? If there are any, how does each influence the office? (Stage 1 / Stakeholder's expectations)
"We have the main customers (MOD and DOD), who want us to make sure that the output is definitely quality, version controlled (i.e. the right version). Also, they want the data people are sending or receiving... whoever they are sending to either internally or externally to be highly secured and nobody else can get hold of it. Because the nature of my job... remember... is to implement systems... and you are dealing with people all the time... and these people do not want to change... all of them... all of them say… We do not want no systems... you know... we like to do the paper based traditional. This is why senior directors want us to do the job accurately and quickly by working with them accurately... get them engaged... get them involved... and committed to the program... the people who are involved in the e-scheduling, e-collaboration and e-sourcing also need to be creative in finding new solutions, unlike the e-catalogue"

5. What do the customers of your office expect? (Stage 1 / Stakeholders' expectations)
"It's the same really! They want accurate real systems they can work with...And not just systems that they get put in...It got to have all the change management things

like the proper education, the training, why they need to use this and that kind of stuff!"

6. Could you list the purpose and goals of the office? And how is it set? (Stage 1 / Organisational Effectiveness, Strategy and Stage 3 / VSM – System 5)
"To automate supply chain and collaboration processes through the use of internet based toolsets in order to reduce the costs of goods and services, improved operational efficiency, enabling greater service improvement whilst ensuring compliance, at the same time up-skilling the supply chain population to work smarter."

7. Could you explain briefly what business strategy do you use to achieve your customers' expectations? (Stage 1 / Strategy)
"Like I said if you plan it and do a proper business plan deployment, you know like August and September of this year, we went out to our customers and said what do you want for next year, and they tell us the key drivers and activities they want required for next year, and then we build our plans around that. And once we've done the plans, we are done! We get the customers to buy it off, and then each individual has a plan against what his customer wants within my team, then they have their objectives for what they want to do next year and they have a training plan linked to those objectives.
I'll give you an example...right... you know, a customer might come approach and say, we need some help in... We need a system to help with stability for tiers... we need a system that show us tier one... tier two... tier three... etc... We have to go there to find a system then work with them to develop the system... So, let the customer to define the how to, we will make it electronically happen but the customer will define it. Does that make sense!
So most of the time we know what's coming up next year but there are incremental activities which we did not plan for next year just occur next year, in about 20% of the activities uncertainty just hits us"

8. Please indicate using the scale provided below where does your office fit. (Stage 1 / Organisational culture – Competing Values Framework)

This office is unpredictable to the point where its culture requires flexibility & discretion to handle it

This office is predictable to the point where its culture requires rigid controls, rules & orders

The two conditions used to analyse the response given using this scale:
   A. <u>If the manager perceives the office to be predictable and marks the answer closer towards the right end of the scale, it means that the culture of the office is considered to be focused, stable and controlled </u>(Cameron, Quinn 1999, Cameron 2009).

      B. <u>If the manager perceives the office to be unpredictable and marks the answer closer towards the left end of the scale, it means that the culture of the office is considered to be flexible</u> (Cameron, Quinn 1999, Cameron 2009).

9. Please indicate using the scale provided below where does your office fit? (Stage 1 / Organisational culture – Competing Values Framework)

The focus within the office is on achieving unity and collaboration between people to accomplish the output of the office

⊗ ▬ ▬ ▬ ▬

The focus within the office is on achieving a competitive advantage through the availability of the right provisions

The two conditions used to analyse the response given using this scale:
      A. <u>If the manager perceives the focus within the office to be on achieving a competitive advantage through the availability of the right provisions, and marks the answer closer towards the right end of the scale, it means that the culture of the office is externally focused</u> (Cameron, Quinn 1999, Cameron 2009).
      B. <u>If the manager perceives the focus within the office to be on achieving unity and collaboration between people, and marks the answer closer towards the left end of the scale, it means that the culture of the office is internally focused</u> (Cameron, Quinn 1999, Cameron 2009).

10. Figure (J.2) presents the four quadrants of the Competing Values Framework. Figure (J.3) illustrates a comparison between the four distinctive Competing Values Framework in terms of the culture, effectiveness, leadership and value drivers. Could you select the framework that most applies to your office? (Stage 1 / Organisational culture – Competing Values Framework)

Figure (J.2) shows the four quadrants of the Competing Values Framework.
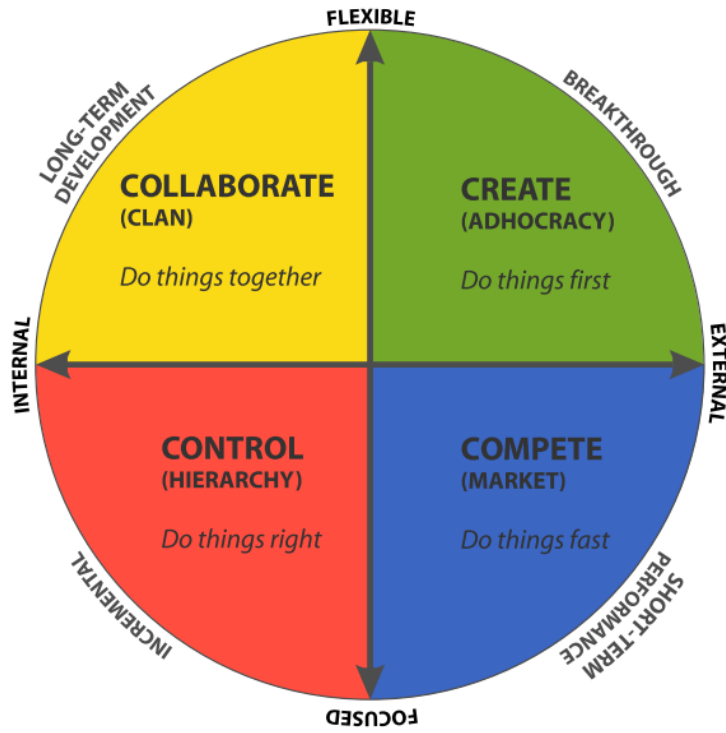
Source: (Cameron 2009).

Figure (J.3) a comparison between the characteristics of the four distinctive Competing Values Framework.

Long-term Change	*Individuality Flexibility*	*New Change*

Culture Type:	CLAN	Culture Type: ADHOCRACY
Orientation:	COLLABORATE	Orientation: CREATE
Leader Type:	Facilitator Mentor Teambuilder	Leader Type: Innovator Entrepreneur Visionary
Value Drivers:	Commitment Communication Development	Value Drivers: Innovative outputs Transformation Agility
Theory of Effectiveness:	Human development and high commitment produce effectiveness.	Theory of Effectiveness: Innovativeness, vision, and constant change produce effectiveness.

Internal Maintenance	**External Positioning**

Culture Type:	HIERARCHY	Culture Type: MARKET
Orientation:	CONTROL	Orientation: COMPETE
Leader Type:	Coordinator Monitor Organizer	Leader Type: Hard-driver Competitor Producer
Value Drivers:	Efficiency Timeliness Consistency & Uniformity	Value Drivers: Market share Goal achievement Profitability
Theory of Effectiveness:	Control and efficiency with capable processes produce effectiveness.	Theory of Effectiveness: Aggressively competing and customer focus produce effectiveness.

Incremental Change	*Stability Control*	*Fast Change*

Source: (Cameron 2009).

"I would say… it is clan"

11. Please indicate using the scale provided below how identifiable the culture of the office is. (Stage 1 / Organisational culture – Weak or strong shared values)

There is no identifiable culture in the office ▬ ▬ ▬ ▬ ⊗ There is one set of cultural values & beliefs in the office held by all members

The two conditions used to analyse the response given using this scale:
   A. If the manager perceives the culture to have one set of cultural beliefs held by all members and marks the answer closer towards the right end of the

scale, it means that their culture of the office is considered to be strong (McKenna 2006, Gordon, Di Tomaso 1992) and more similar to mechanistic structures (Schein 1985).

B. If the manager perceives the culture to have no set of cultural beliefs and marks the answer closer towards the left end of the scale, it means that their culture of the office is considered to be weak (McKenna 2006, Robey, Sales 1994, Schein 1985) and more similar to organic structures as they are proven to be more adaptable to external or environmental changes (Robey, Sales 1994, Schein 1985).

12. Could you list the cultural values held by the people of your office? (Stage 1 / Organisational culture – Shared values)
"Quality, version controlled (It's got to be the right version), accurate, commitment, involvement of the customer and highly secured"

13. Please use the scale below to indicate the level of resistance to change due to the beliefs and general values of the employees of your office? (Stage 1 / Organisational culture – Weak or strong shared values)

There is no resistance to change due to the beliefs and values of the people working in the office ⊗ ▬ ▬ ▬ ▬ There is resistance to change due to the beliefs and values of the people working in the office

The two conditions used to analyse the response given using this scale:

A. If the manager perceives the values and beliefs of the employees of the office to cause resistance to change or marks the answer closer towards the right end of the scale, it means that the culture of the office tends to be strong as it is hard to change and similar to Mechanistic or Bureaucratic systems (Schein 1985) where behavioural controls won't be needed (Robey, Sales 1994).

B. If the manager perceives the values and beliefs of the employees of the office to cause no resistance to change or marks the answer closer towards the left end of the scale, it means that the culture of the office tends to be weak as it is proven to be more adaptable to external or environmental changes and similar to organic systems (Robey, Sales 1994, Schein 1985).

14. If you were to relate to occasions when you had newly untrained employee in the office, could you list the task activities of your office that this employee may perceive as complex? If there are not any task activities, please skip the next question. (Stage 1 / Task complexity)
"e-sourcing, e-collaboration & e-scheduling"

15. If any task activities of the office, which were perceived to be complex by a new untrained employee, were listed in the previous question please indicate using

the scale provided below the level of complexity for each of the listed task activities. (Stage 1 / Task complexity)

e-sourcing

The tasks of this task activity assume a small diversity of states or modes of behaviour ▬ ▬ ▬ ▬ ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour

e-collaboration

The tasks of this task activity assume a small diversity of states or modes of behaviour ▬ ▬ ▬ ▬ ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour

e-scheduling

The tasks of this task activity assume a small diversity of states or modes of behaviour ▬ ▬ ▬ ▬ ⊗ The tasks of this task activity assumes a large diversity of states or modes of behaviour

The two conditions used to analyse the response given using this scale:
A. If the manager perceives the tasks of this task activity to assume a large diversity of states or modes of behaviour or closer towards the right end of the scale, it means that this task activity is complex (Schwaninger 2009, Nicolis 1995).
B. If the manager perceives the tasks of this task activity to assume a small diversity of states or modes of behaviour or closer towards the left end of the scale, it means that this task activity is simple (Schwaninger 2009, Nicolis 1995).

16. Could you list the task activities of your office which are regarded to have tasks with high level of variety? If there are not any task activities, please skip the next question. (Stage 1 / Task complexity, variety)
"I think it would be in the tasks related to providing the training of the e-sourcing… also… e-collaboration and e-scheduling"

17. If any task activities of the office, which have tasks with high level of variety, were listed in the previous question please indicate using the scale provided below the level of variety for each of the listed task activity. (Stage 1 / Task complexity, variety)
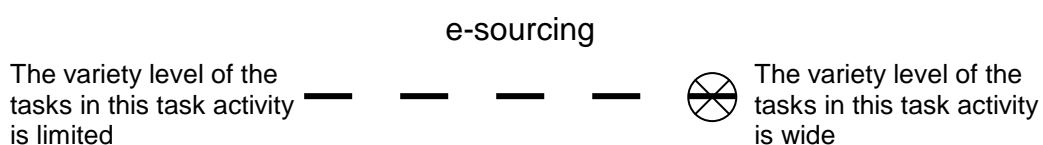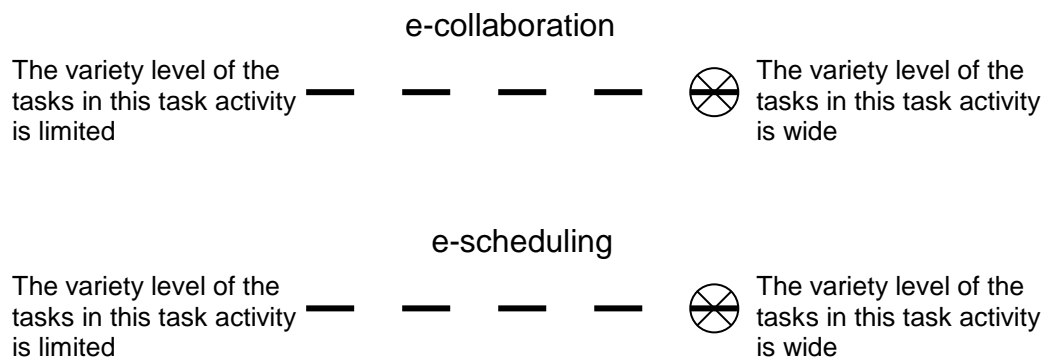
e-sourcing

The variety level of the tasks in this task activity is limited ▬ ▬ ▬ ▬ ⊗ The variety level of the tasks in this task activity is wide

e-collaboration

The variety level of the
tasks in this task activity — — — — ⊗ The variety level of the
is limited   tasks in this task activity
                                                            is wide

e-scheduling

The variety level of the
tasks in this task activity — — — — ⊗ The variety level of the
is limited   tasks in this task activity
                                                            is wide

The two conditions used to analyse the response given using this scale:

   A. <u>If the manager perceives the level of variety in the tasks of this task activity is wide or closer towards the right end of the scale, it means that it is complex due to a larger number of distinct states or elements of a system</u> (Schwaninger 2009, Ashby 1956).
   B. <u>If the manager perceives the level of variety in the tasks of this task activity as limited or closer towards the left end of the scale, it means that it is simple due to a smaller number of distinct states or elements of a system</u> (Schwaninger 2009, Ashby 1956).

18. Could you list the task activities of your office which requires employees to have a complex skill set to carry them out? (Stage 1 / Skill set and Stage 12 / Weak or strong situation – Skill set)

"e-sourcing, e-collaboration and e-scheduling… I think that these require higher skills than in the e-catalogue… e-catalogue is for secretaries… you know for secretaries if they need to pads, pens… instead of using different supplier ringing around and looking in catalogues manually, you just go electronically in the Rolls Royce Portal… look at the catalogue.. a global catalogue… and they can only choose those suppliers not certain suppliers… So we already got good deals with them, you see… so its saving us money… you see…"

19. Please indicate using the scale provided below the level of skill set for each of the task activities of the office. (Stage 1 - Skill set)

e-sourcing

The skill set required
to carry out the tasks
of this task activity is — — — — ⊗ The skill set required
simple   to carry out the tasks
                                                          of this task activity is
                                                          complex

e-collaboration

The skill set required to carry out the tasks of this task activity is simple — — — ⊗ — The skill set required to carry out the tasks of this task activity is complex

e-scheduling

The skill set required to carry out the tasks of this task activity is simple — — — ⊗ — The skill set required to carry out the tasks of this task activity is complex

e-catalogue

The skill set required to carry out the tasks of this task activity is simple ⊗ — — — — The skill set required to carry out the tasks of this task activity is complex

The two conditions used to analyse the response given using this scale:

A. If the manager perceives the skill set required to carry out the tasks of this task activity to be complex or closer towards the right end of the scale, it means that this task activity tends to be complex due to the high level of required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988).

B. If the manager perceives the skill set required to carry out the tasks of this task activity of the office to be simple or closer towards the left end of the scale, it means that this task activity tends to be simple due to the low level of required skill set (Bystrom, Jarvelin 1995, Tushman, Nadler 1978, Campbell 1988).

20. Please indicate using the scale provided below the level of financial restrictions that are imposed on the budget of your office (Stage 1 / Financial restrictions).

There are relatively many financial restrictions on the budgets of the office — ⊗ — — — The budget of the office is open with relatively no restrictions

The two conditions used to analyse the response given using this scale:

A. If the manager perceives the financial resources of the office to be influenced by high budget restrictions or closer towards the left end, it means these restrictions must be considered whilst redesigning the office.

B. If the manager perceives the financial resources of the office to be not influenced by any budget restrictions or closer towards the right end, it

<u>means there are relatively little financial restrictions that does not require a great deal of attention whist redesigning the office, because it has little influence on the redesign process.</u>

21. In the box provided in Figure (J.4) below the interviewer is going to draw the layout of the office: (Stage 1 / Constraints of office layout)
    Figure (J.4) shows a rough layout of the office.
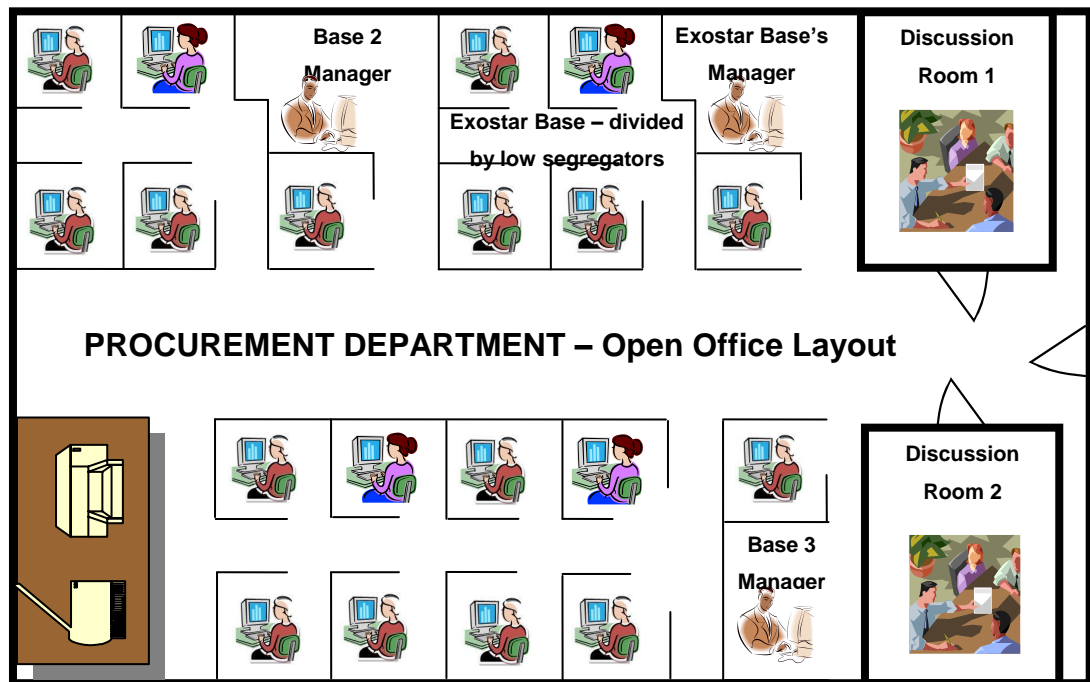
22. Are there any physical constraints that could restrict any particular redesign layouts? (Stage 1 / Constraints of office layout)
"No constraints, I do not think so!"

23. Could you describe the structure of the employees of your office (i.e. in terms of hierarchy)? (Stage 1 / Structure)
"There is only me in the office and five other employees"

24. Could you list the task activities of the office and state the percentage of each in relation to the other tasks of the office? Could you relate the percentage of each to the Lucas concept of runners, repeaters and strangers? Runners are the tasks that are most carried out in the office. Repeaters are the ones that are repeated often in the office and the strangers are ones that are rarely carried out in the office (Lucas Mini Guide 1991) (Stage 2 / Identifying all task activities of the office)
"The e-scheduling tasks are the runners, because they are about 40%... The e-sourcing tasks are the repeaters because they are about 30%...I would say the e-collaboration tasks are the repeaters, because they are around 20%... whereas the

e-catalogue tasks are the strangers because they are about 8%... you've also got other random tasks which are about 2%."

25. Is the work coordinated and allocated to the employees in your office or is it coordinated by the employees themselves? If it is done by others, could you list the people who handle this coordination process? (Stage 3 / VSM – System 2)

"Both, it is coordinated by them and others
There is a plan, which coordinates the jobs and activities for people in the office. This plan is done by them and me and reviewed once in a while. It is also judged by the senior directors of the organisation to make sure that we usually prioritise the jobs and do the ones which are most important
For instance, the top half of the plan is what everybody does in common, the bottom half is individual depending on their specific tasks. The jobs they have is unique to themselves, everybody does their own jobs...
There are common things where people can help... and we discuss that there is a common thing going on here in a team meeting... can anybody do it! And then they volunteer... in a volunteer basis..."

26. Table (J.3) illustrates different types of coordination modes used within offices.

Coordination Modes
"First come/first serve", priority order, budgets, managerial decision, market-like bidding, notification, sequencing, tracking, make to order vs. make to inventory ("pull" vs. "push"), place orders using "economic order quantity", "Just In Time" (Kanban system), detailed advanced planning, ship by various transportation modes, make at point of use, inventory management (e.g. "Just in Time" and "Economic Order Quantity"), standardisation, ask individual users (e.g., by having customer agree to purchase and/or by using participatory design), concurrent engineering, goal selection, task decomposition, simulation such as in Boeing, daily build such as in Microsoft, schedules, synchronisation, categorisation, rules, procedures, committees, planning, scheduled meetings, unscheduled meetings, face to face discussion, mutual adjustments, interdepartmental teams, teamwork, standardisation of norms, ideology and culture, standardisation of skills, standardisation of outputs, standardisation of work processes, mutual adjustment, direct supervision.

Referring to Table (J.3) could you roughly choose the suitable coordination modes used within your offices and its various task activities? (VSM – System 2, Coordination modes)

"In general we use planning, goal selection, task decomposition, managerial decision, priority order, unscheduled team meetings, standardisation and standardisation of norms… you know…we also ask individual users through participatory design.
In more details, for the e-sourcing, e-collaboration & e-scheduling, we use schedules, mutual adjustments and interdepartmental teams, however for e-catalogue, we use rules and schedules"
"To coordinate the shared tasks we use managerial decisions and schedules"

27. Do you use a plan for the implementation of each task activity of the office to deliver the office's products / services? If yes, could you explain how these plans are formed? (Stage 3 / VSM – System 3)

"Yes, like I said… There is a plan called Business Plan Deployment Pack Contents for each of the employees… I will give it to each one of them to keep it and look at it. It consists of various parts… It coordinates the jobs and activities of the people of the office. This plan is done by them and me and reviewed once in while... It is also judged by the senior directors of the organisation. Controlling the employees will also come probably from me in terms of how I am gonna make that happen for them."

28. Management control systems are used to monitor and evaluate the performance of organisations as a means of developing human resources with productivity strongly in mind (Mullins 2007, McKenna 2006, Chenhall 2003, Robey, Sales 1994). Could you list any form(s) of management control systems used to measure the people in your office in your office (e.g. output and behavioural controls)? (Stage 3, VSM – System 3* and Stage 13 / Management control systems)

"There were targets set… in terms of … for example… for e-scheduling there were targets sets to the people operating that process, then they had to do so many per month… ya… using the e-sourcing tool… ya… they were rewarded at the end of the year, which was built in with their objectives, when they sit down when their manager, they will discuss that… to make it very simple, if you look at e-scheduling, you can do it manually by telephoning and emailing using outlook… you know… but we wanted them to use the tool, ya… and the tool worked in Rolls Royce is that we knew, which department was using… when… how… so we will provide that data to the manager… then it is that person (the individual) at the end of the year say 'ya I did this… that… that… this' then the manager can look at the data we sent them and say 'actually its incorrect… you've been working outside the process and outside the tool using manual, because the data is telling me this'… you see what I mean… we are monitoring in the background, but the tool gives us data… and we'll take that data and send it the managers and they can decide how they want to do it… This is done monthly... So individually, the people inside the department had targets to use this tool… how much of that tool they use… they had a number… now… their managers even had a target… because I will send it to the directors… so the directors will see, 'he will tell the manager 'oh why is not your department is using this tool as much, you are utilising only 30%... by is that…' do you see what I mean… and that director will report-in to the chief procurement officer and will send him the report as well, so the chief procurement officer, the man right at the top, will see why you Mr director not getting your people to be heavily use this tool… you see what I mean… so it is all interlinked at hierarchy level as well… the alternative way to use these tools is to work outside like we normal before, so if you look at e-scheduling you would use the telephone, which is costing money… you will use emails and the data is come back in different variety… e-scheduling is using one standard tool to standardise the process and making it lean… all the other task activities are like that too like e-sourcing… and the others… this is about getting rid of the different means of doing things and adopting just one way of doing it… standardisation…

Monthly output control, every month we monitor the output of what they are doing, so they have a plan, they have objectives to the plan, and they have a section for how you monitor them against the plan. This is done through a spreadsheet of four blocks to monitor their output.

You got behaviour controls… Behaviour has got to be Rolls Royce behaviour, Rolls Royce has got 13 leadership behaviours, which is expected of all employees. They need to conform to that because at the end of the year... you know… We appraise them or we give them a mark each of the employees and they are against the thirteen leadership behaviours and how they are doing against them. We look at the output and the behaviour at the same time at the end of the year.

But we monitor both every month. Behaviour I have a one to one every month with each individual. So I monitor how they are doing with their behaviour then we look at output as well.

Separately, our team has a monitor with senior directors every month on how we are doing with the outputs (not behaviour but outputs).

We also get customer feedback like surveys, which is from the shop floor… based on the employee's output…

Behaviour we do once a month, output we do once a month but separately, there are separate, we do not do it at the same time here…. And then a senior director comes for the outputs, so in front of him, you are seeing how you are doing monthly against his plan.

Like I said once a business plan deployment is done, by finding out what the customer wants in August and September for its following year, we assess and evaluate the skills needed for each of the individuals according to his plan, then they have their objectives for what they want to do next year and they have a training plan linked to those objectives."

29. Please indicate using the scale provided below the extent to which behavioural controls are used in your office (Stage 3 / VSM – System 3* and Stage 13 / Management control systems – Behavioural controls)
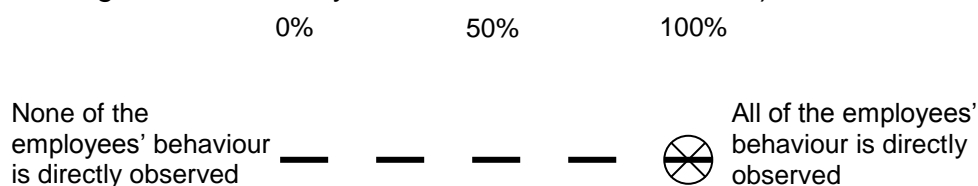
<div align="center">

0%   50%   100%

</div>

None of the employees' behaviour is directly observed ▬ ▬ ▬ ▬ ⊗ All of the employees' behaviour is directly observed

The two conditions used to analyse the response given using this scale:

    A. <u>If the manager perceives that all the employees' behaviour is directly observed, or marks the scale closer towards the right end, it means that behavioural controls by direct observations are used for the office</u> (Mullins 2007).

    B. <u>If the manager perceives that all the employees' behaviour is not directly observed, or marks the scale closer towards the left end, it means that behavioural controls by direct observations are not used for the office</u> (Mullins 2007).

30. Does your office receive information that may change, modify or improve the way the activities and tasks of the office are carried out (e.g. market feedback, technology changes, other external factors etc.)? If yes, could you list who receives this information? (Stage 3 / VSM – System 4)

"This will come from the mentor (or the sponsor) on how they want those processes done and which one.

This information can also be received to any member of the team including myself it could be about new software I would say... or generally new technology that may come out which anyone in the office might inform me about... you know what I am saying... also... customer feedback is very important and gets sent to me..."

31. Please list any task activities that do not add value to the office? (Stage 3 / VSM – Systems 1, 2, 3, 4 & 5)

"None"

32. Could you list the task activities of your office which may be influenced by rules or procedures imposed by internal or external parties (e.g. Suppliers, regulatory agencies, labour market, clients and customer, competitors, scientific and technical communities... etc)? If there are not any task activities, please skip the next section. (Stage 4 / Input environmental uncertainty)

"All the task activities are influenced by security standards imposed by MOD and DOD"

33. Please indicate using the scale provided below the level of influence of other parties on the rules, standards and procedures of each task activity of the office. (Stage 4 / Input environmental uncertainty)
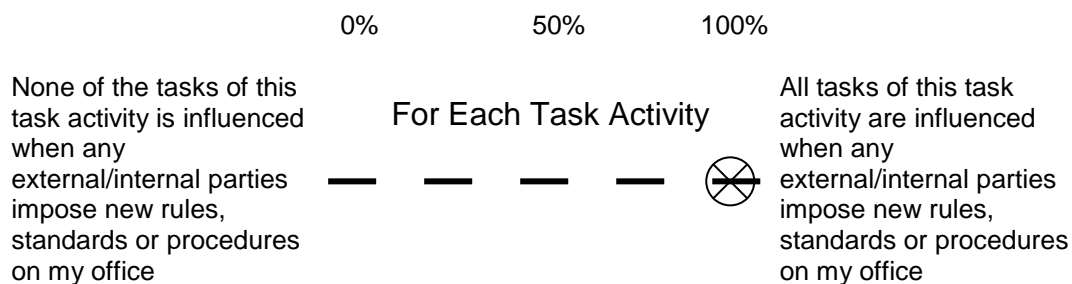
0%	50%	100%

None of the tasks of this task activity is influenced when any external/internal parties impose new rules, standards or procedures on my office

For Each Task Activity ⊗

All tasks of this task activity are influenced when any external/internal parties impose new rules, standards or procedures on my office

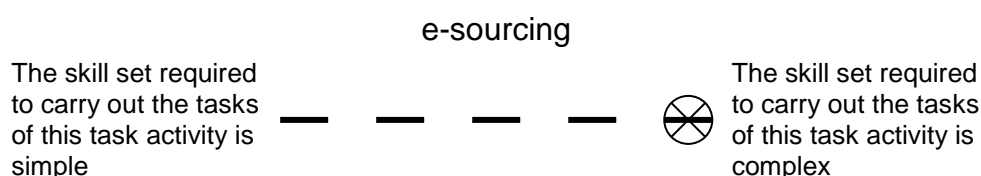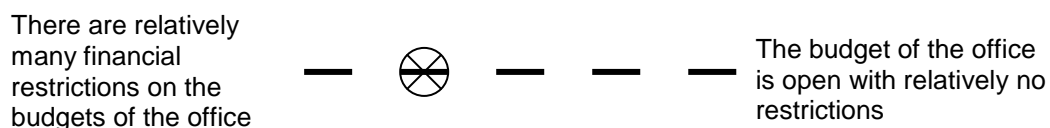**The two conditions used to analyse the response given using this scale:**
    A. <u>If the manager perceives that all tasks of this task activity are influenced by rules or procedures imposed by any parties, or marks the scale closer towards the right end, it means that input environmental uncertainty tends to be unpredictable for this task activity </u>(McKenna 2006, Robey, Sales 1994, Dill 1958).
    B. <u>If the manager perceives that none of the tasks of this task activity are influenced by rules or procedures imposed by any parties, or marks the scale closer towards the left end, it means that input environmental</u>

<u>uncertainty tends to be predictable for this task activity</u> (McKenna 2006, Robey, Sales 1994, Dill 1958).

34. Could you list any task activities of your office which may have lack of patterning in the process and knowledge used to produce them? If there are not any task activities, please skip the next question. (Stage 4 / Task operation uncertainty)
"e-sourcing, e-collaboration & e-scheduling do not have fixed process, because they are done by applying different dimensions to them, which relies on humans"

35. If any of the task activities of the office have unknown tasks that cannot be predicted in term so it's detailed subtasks were listed in the previous question. Please indicate using the scale provided below the level of this unpredictability for each of the task activities. (Stage 4 / Task operation uncertainty)
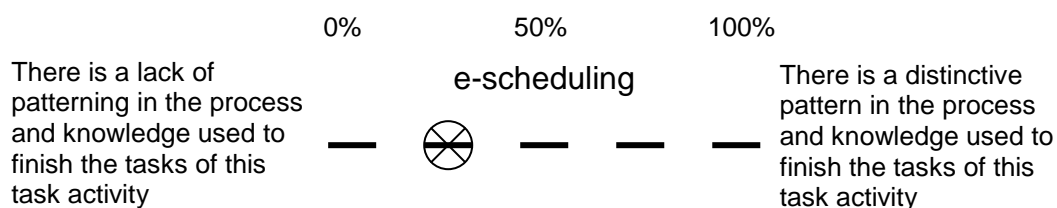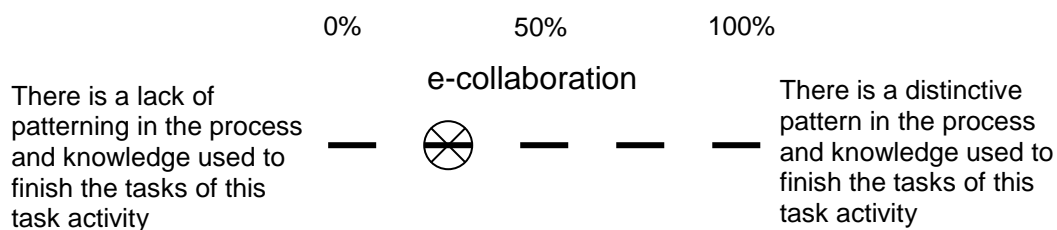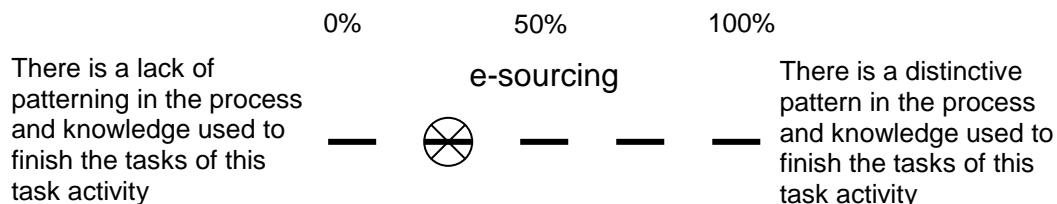
The two conditions used to analyse the response given using this scale:
    A. <u>If the manager perceives a distinctive pattern in the process and knowledge used to finish the tasks of this task activity, or marks the scale closer towards the right end, it means that task operation uncertainty tends to be predictable for this task activity</u> (Robey, Sales 1994, Perrow 1967).
    B. <u>If the manager perceives a lack of patterning in the process and knowledge used to finish the tasks of this task activity, or marks the scale closer towards the left end, it means that task operation uncertainty tends</u>

to be unpredictable for this task activity (Robey, Sales 1994, Perrow 1967).

36. Could you list any task activities of your office which may have tasks with unknown specific time required to complete them? If there are not any task activities, please skip the next question. (Stage 4 / Task operation uncertainty)
"e-sourcing & e-collaboration"

37. If any task activities of the office that have tasks with unknown time required to complete them were listed in the previous question. Please indicate using the scale provided below the level of this unpredictability in time for each of the listed task activities. (Stage 4 / Task operation uncertainty)

	0%	50%	100%	
There is a lack of knowledge about the time needed to complete the tasks of this task activity		e-sourcing ⊗ — — — —		There is a sufficient knowledge about the time needed to complete the tasks of this task activity

	0%	50%	100%	
There is a lack of knowledge about the time needed to complete the tasks of this task activity		e-collaboration ⊗ — — — —		There is a sufficient knowledge about the time needed to complete the tasks of this task activity

The two conditions used to analyse the response given using this scale:
A. If the manager perceives that there is a sufficient knowledge about the time required to complete the tasks of this task activity, or marks the scale closer towards the right end, it means that task operation uncertainty tend to be predictable for this task activity(Robey, Sales 1994, Perrow 1967).
B. If the manager perceives that there is a lack of knowledge about the time required to complete the tasks of this task activity, or marks the scale closer towards the left end, it means that task operation uncertainty tends to be unpredictable for this task activity (Robey, Sales 1994, Perrow 1967).

38. Could you list any task activities of your office influenced by absenteeism of a critical employee who provides input or work necessary for its completion? If there are not any task activities, Please skip the next question. (Stage 4 / Task operation uncertainty – Absenteeism)
"e-sourcing, e-collaboration & e-scheduling"

39. If any task activities of the office, which were influenced by employee absenteeism, were listed in the previous question please indicate using the scale provided below the level of influence on each listed task activity. (Stage 4 / Task operation uncertainty – Absenteeism)

0%   50%   100%

e-sourcing

All the tasks can be carried out in this task activity, when a critical employee is absent   ⊗   All tasks of this task activity cannot be carried out, when a critical employee is absent

0%   50%   100%

e-collaboration

All the tasks can be carried out in this task activity, when a critical employee is absent   ⊗   All tasks of this task activity cannot be carried out, when a critical employee is absent

0%   50%   100%

e-scheduling

All the tasks can be carried out in this task activity, when a critical employee is absent   ⊗   All tasks of this task activity cannot be carried out, when a critical employee is absent

The two conditions used to analyse the response given using this scale:
   A. If the manager perceives that all tasks of this task activity cannot be carried out when a critical employee is absent, or marks the scale closer towards the right end, it means that task operation uncertainty due to absenteeism tends to be unpredictable for this task activity.
   B. If the manager perceives that the number of tasks that cannot be carried out, when a critical employee is absent, is relatively low compared to the rest of the tasks of this task activity that can be carried out, or marks the scale closer towards the left end, it means that task operation uncertainty due to absenteeism tends to be predictable for this task activity.

40. Could you list any task activities of your office which cannot be processed due to a lack of skills to be acquired? If there are not any task activities, Please skip the next question. (Stage 4 / Task operation uncertainty – Training)
"None"

41. If any task activities of the office that cannot be processed due to lack of skill set which can be acquired through training were listed in the previous question,

please indicate using the scale provided below the level of influence on each listed task activity (Stage 4 / Task operation uncertainty – Training)

0%   50%   100%

The employee does not require ongoing training to be able to continually process this task activity

━ ━ ━ ━ ━

The employee always requires ongoing training to enable him/her to continually process this task activity
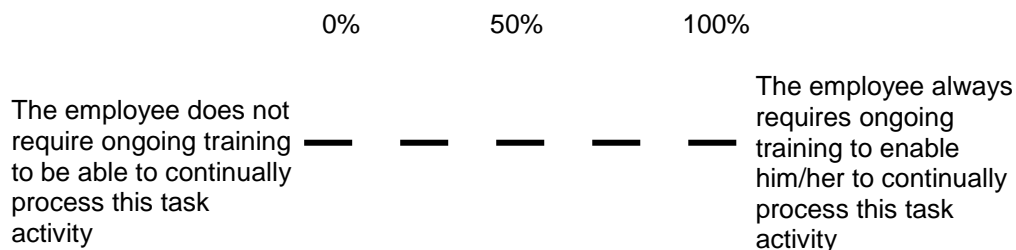
The two conditions used to analyse the response given using this scale:
   A. <u>If the manager perceives that this task activity is frequently faced with employees who lack the skill set to do them and therefore require training, or marks the scale closer towards the right end, it means that task operation uncertainty due to training for the related task activities tend to be unpredictable.</u>
   B. <u>If the manager perceives that this task activity is faced with employees who are equipped with competent skill set or marks the scale closer towards the left end, it means that task operation uncertainty due to training for the related task activity tend to be predictable.</u>

42. Could you list any task activities of the office which cannot be processed due to the breakdown of important technology required for its completion? Could you also list the type(s) of technology that affects each? If there are not any task activities, please skip the next question. (Stage 4 / Task operation uncertainty – Technology breakdown)
"None"

43. If any task activities of the office, which cannot be processed due to technology breakdown, were listed in the previous question please indicate using the scale provided below the level of influence on each listed task activity. (Stage 4 / Task operation uncertainty – Technology breakdown)

0%   50%   100%

The employee has always got tasks to do regardless of technology breakdown

━ ━ ━ ━ ━

The employee is idle due to technology breakdown

The two conditions used to analyse the response given using this scale:
   A. <u>If the manager perceives that all tasks of this task activity experiences delay and/or idleness whilst processing due to technology breakdown, or marks the scale closer towards the right end, it means that task operation</u>

uncertainty due to technology breakdown for the related task activities tend to be unpredictable.

B. If the manager perceives that none of the tasks of this task activity experiences delay and/or idleness whilst processing due to technology breakdown, or marks the scale closer towards the left end, it means that task operation uncertainty due to technology breakdown for the related task activity is tend to be predictable.

44. Could you list any task activities of the office which cannot be processed due to waste of time waiting (e.g. waiting for delayed inputs from others… etc)? Does this result in making any of the employees idle? If there are not any task activities, please skip the next question. (Stage 4 / Task operation uncertainty – Waste of waiting)

"None"

45. If any task activities of the office, which cannot be processed due to waste of time waiting and may result in making any employee idle, were listed in the previous question please indicate using the scale provided below the level of influence on each listed task activity. (Stage 4 / Task operation uncertainty – Waste of waiting)

0%	50%	100%

The employee has always got tasks to do regardless of waste of waiting
— — — — —
The employee is idle due to waste of waiting

The two conditions used to analyse the response given using this scale:

A. If the manager perceives that all tasks of this task activity experiences delay and/or idleness whilst processing due to waist of waiting, or marks the scale closer towards the right end, it means that task operation uncertainty due to waste of waiting for the related task activities tend to be unpredictable.

B. If the manager perceives that none of the tasks of this task activity experiences delay and/or idleness whilst processing due to waist of waiting, or marks the scale closer towards the left end, it means that task operation uncertainty due to waste of waiting for the related task activity tend to be predictable.

46. Could you list any task activities of the office which has volatile customer specification? If there are not any task activities, please skip the next question. (Stage 4 / Output environmental uncertainty – Dynamism)

"e-sourcing, e-collaboration and e-scheduling"

47. If any task activities of the office that have volatile customer specifications were listed in the previous question. Please indicate using the scale provided below

the level of volatility in customer specifications for each of the listed task activities. (Stage 4 / Output environmental uncertainty – Dynamism)

	0%	50%	100%	
The customer needs (products or services) specifications of this task activity are stable	**e-sourcing** ▬ ▬ ▬ ⊗ ▬			The customer needs (products or services) specifications of this task activity are volatile and fluctuating

	0%	50%	100%	
The customer needs (products or services) specifications of this task activity are stable	**e-collaboration** ▬ ▬ ▬ ⊗ ▬			The customer needs (products or services) specifications of this task activity are volatile and fluctuating

	0%	50%	100%	
The customer needs (products or services) specifications of this task activity are stable	**e-scheduling** ▬ ▬ ▬ ⊗ ▬			The customer needs (products or services) specifications of this task activity are volatile and fluctuating

The two conditions used to analyse the response given using this scale:

A. If the manager perceives the customer needs specifications of this task activity to be volatile and fluctuating or marks the scale closer towards the right end, it means that output environmental uncertainty due to dynamism tend to be unpredictable for this task activity (McKenna 2006, Miller, Friesen 1984, Kreiser, Marino 2002, Huczynski, Buchanan 2007).

B. If the manager perceives the customer needs specifications of this task activity to be stable or marks the scale closer towards the left end, it means that output environmental uncertainty due to dynamism tend to be predictable for this task activity (McKenna 2006, Miller, Friesen 1984, Kreiser, Marino 2002, Huczynski, Buchanan 2007).

48. Could you list any task activities of the office which has unpredictable frequency of customers' orders? If there are not any task activities, please skip the next question. (Stage 4 / Output environmental uncertainty – Customer demand uncertainty)
"e-collaboration"

49. If any task activities that have unpredictable demand were listed in the previous question, please indicate using the scale provided below the level of unpredictability in customer demand for each of the listed task activities. (Stage 4 / Output environmental uncertainty – Customer demand uncertainty)

<div align="center">

0%   50%   100%

e-collaboration

</div>

The frequency of customers demand for this task activity is predictable ▬ ▬ ▬ ⊗ ▬ The frequency of customers demand for this task activity is unpredictable
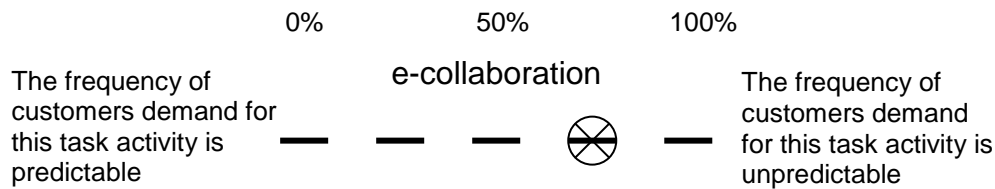
The two conditions used to analyse the response given using this scale:
  A. <u>If the manager perceives the frequency of the customer demand of this task activity to be unpredictable or marks the scale closer towards the right end, it means that output environmental uncertainty due to customer demand uncertainty tend to be unpredictable for this task activity.</u>
  B. <u>If the manager perceives the frequency of the customer demand of this task activity to be predictable, or marks the scale closer towards the left end, it means that output environmental uncertainty due to customer demand uncertainty tend to be unpredictable for this task activity.</u>

50. Could you list any task activities of the office involving unexpected problems which require human judgements or intuition of the employees to be solved (i.e. cannot be solved using standardised solutions)? If there are not any task activities, please skip to the next question. (Stage 5 / Task analysability)
"e-sourcing, e-collaboration & e-scheduling"

51. If any task activities involving tasks with unexpected problems that cannot be solved using standardised solutions were listed in the previous question, please indicate using the scale provided below the percentage of these unanalysable tasks for each of the listed task activities. (Stage 5 / Task analysability)

<div align="center">

0%   50%   100%

e-sourcing

</div>

The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed ▬ ⊗ ▬ ▬ ▬ The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments

0%   50%   100%

e-collaboration

The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed	⊗	The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments

0%   50%   100%

e-scheduling

The tasks of this task activity cannot be broken down into a standardised or a known procedure of a sequence of detailed subtasks as human judgments are often needed	⊗	The tasks of this task activity can be broken down into a standardised or known procedure of a sequence of detailed subtasks without the need for human judgments

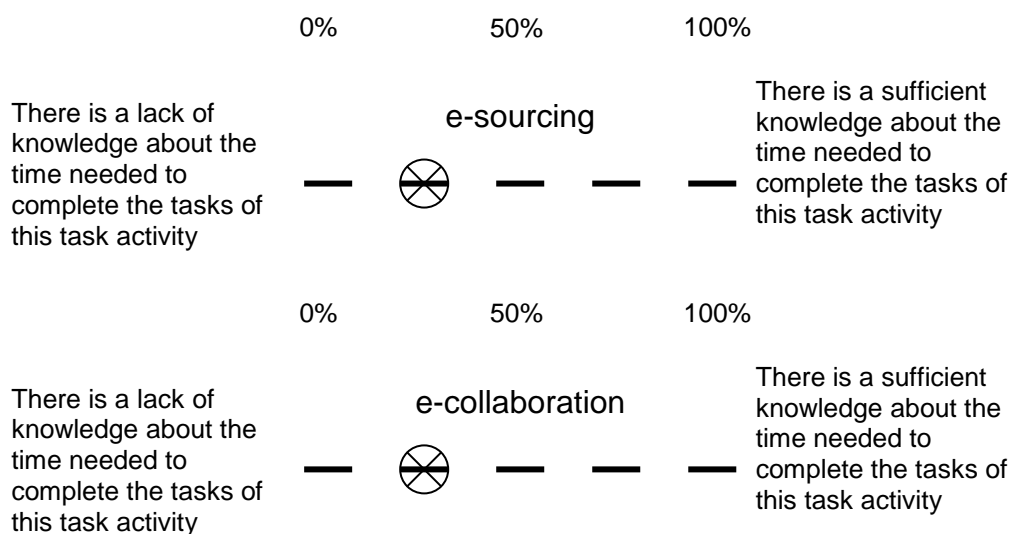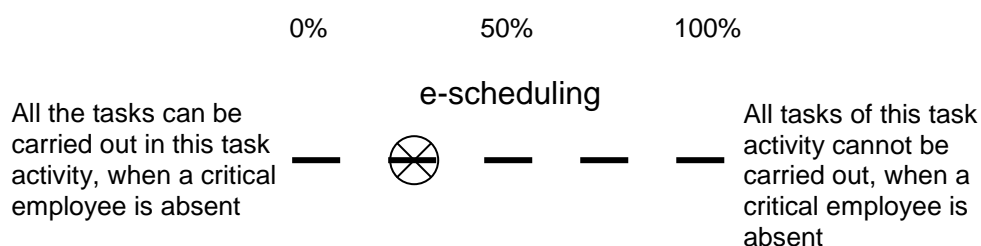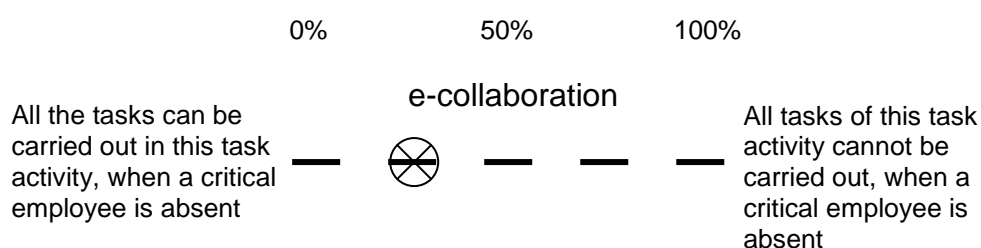**The two conditions used to analyse the response given using this scale:**

    A. If the manager perceives that the problems faced while processing the tasks of this task activity can be broken down into a sequence of detailed standardised subtasks and known procedures or marks the scale closer towards the right end, it means that task analysability tend to be unpredictable for this task activity (Huczynski, Buchanan 2007, Perrow 1971, Blili, Raymond et al. 1998, Chang, Chang et al. 2003).

    B. If the manager perceives that the problems faced while processing the tasks of this task activity cannot be broken down into a sequence of detailed standardised subtasks or known procedures or marks the scale closer towards the left end, it means that task analysability tend to be predictable for this task activity (Huczynski, Buchanan 2007, Perrow 1971, Blili, Raymond et al. 1998, Chang, Chang et al. 2003).

52. Could you list the task activities of your office that consists of at least one organic task that requires high levels of both discretion and skill set to be carried out? (Stage 6 / Identify task activity type)
"e-sourcing, e-collaboration and e-scheduling"

53. Could you list any task activities of the office which may involve tasks that have high risks (e.g. life threatening risks or major losses risks that would threaten the organisation's viability)? (Stage 8 / Divide organic task activities in terms of risk)
    "None"

54. Please indicate using the scale provided below the level of risk for each of the task activities of the office. (Stage 8 / Divide organic task activities in terms of risk)

The consequences of failing whilst carrying out this task activity are simple (i.e. such as having to repeat the job).	e-sourcing ⊗ ▬ ▬ ▬ ▬	The consequences of failing whilst carrying out this task activity are serious (i.e. such as life threatening, organisation bankruptcy).
The consequences of failing whilst carrying out this task activity are simple (i.e. such as having to repeat the job)	e-scheduling ⊗ ▬ ▬ ▬ ▬	The consequences of failing whilst carrying out this task activity are serious (i.e. such as life threatening, organisation bankruptcy)
The consequences of failing whilst carrying out this task activity are simple (i.e. such as having to repeat the job)	e-collaboration ⊗ ▬ ▬ ▬ ▬	The consequences of failing whilst carrying out this task activity are serious (i.e. such as life threatening, organisation bankruptcy)
The consequences of failing whilst carrying out this task activity are simple (i.e. such as having to repeat the job)	e-catalogue ⊗ ▬ ▬ ▬ ▬	The consequences of failing whilst carrying out this task activity are serious (i.e. such as life threatening, organisation bankruptcy)

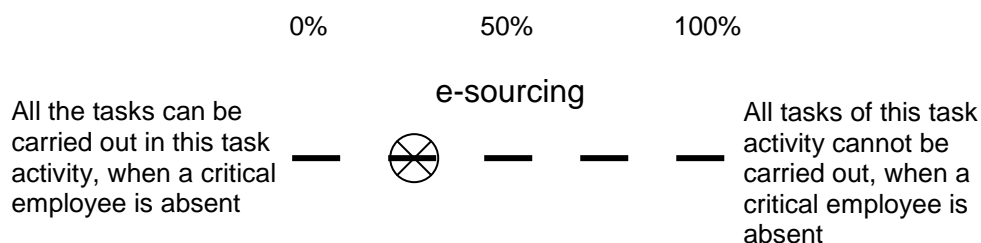**The two conditions used to analyse the response given using this scale:**
   A. If the manager perceives that the risk of making a mistake associated with the execution of this task activity is serious or marks the scale closer towards the right end, it means that risk is high for this task activity.
   B. If the manager perceives that the risk of making a mistake associated with the execution of this task activity is simple, or marks the scale closer towards the left end, it means that risk is low for this task activity.

55. The method used to arrange the interactions among various units contributing to the completion of each task activity of the office are illustrated in Figure (J.5).

These units are resembled using circles within this figure. Exemplars of these units are people, offices, departments or companies. The direction of the communication taking place between the units is also portrayed using the arrows. As a result different work arrangements, which may exist in offices, are portrayed using the following diagrams:

Figure (J.5) shows various types of interactions between various units.
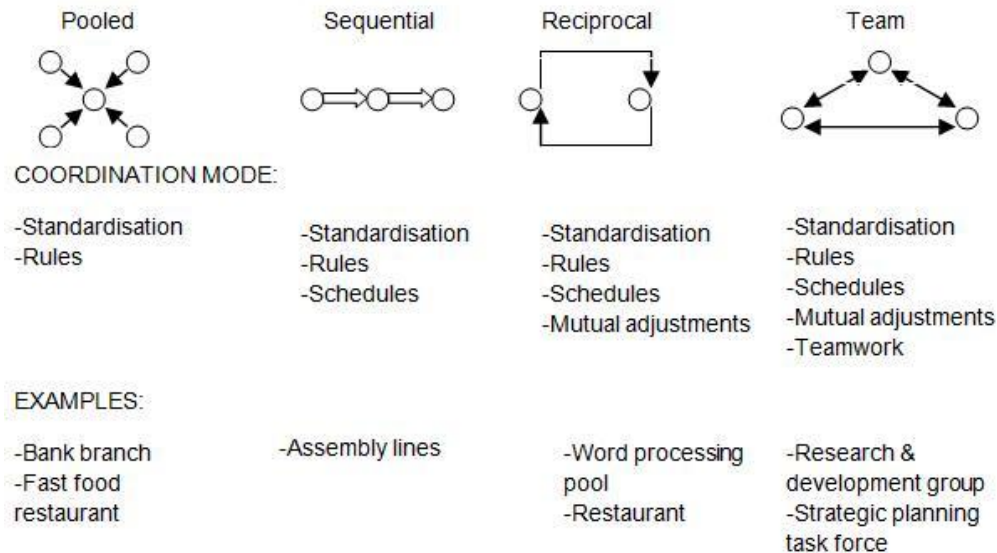
Referring to Figure (J.5) could you roughly choose the work arrangement used to handle each of the task activities of your office? (Stage 10 / Interdependence, coordination)

"I would say… e-sourcing, e-collaboration & e-scheduling are team, however e-catalogue is sequential"

56. The following resources might be shared while implementing the various task activities of the office:
    A. Money
    B. Storage
    C. Space
    D. Employee time
    Please select any of the following resources if they are being shared between the various task activities of the office? (Stage 10 / Malone dependency – Sharing dependency)

"I would say money and employee time are shared in all task activities of the office"

57. If you were to consider that each task activity of your office ultimately consists of a sequence of tasks. Could you list any task activities of your office which may have tasks in its sequence with output that must be finished in order to be used as input for the next task in the sequence? (Stage 10 / Malone dependency – Flow perquisite dependency)

"e-sourcing, e-collaboration, e-scheduling and e-catalogue"

58. If you were to consider that each task activity of your office ultimately consists of a sequence of tasks. Could you list any task activities of your office which may

have tasks in its sequence with processed output (e.g. physical raw material or information) that must be transferred (e.g. physically or communicated) in order to be used as input for the next task in the sequence? (Stage 10 / Malone dependency – Flow accessibility dependency)
"e-sourcing, e-collaboration, e-scheduling and e-catalogue"

59. If you were to consider that each task activity of your office ultimately consists of a sequence of tasks. Could you list any task activities of your office which may have tasks in its sequence with processed output (e.g. physical raw material or information) that must be usable (i.e. right thing) in order to be used as input for the next task in the sequence? (Stage 10 / Malone dependency – Flow usability dependency)
"e-sourcing, e-collaboration, e-scheduling and e-catalogue"

60. Could you list any task activities of your office which may have tasks that needs to occur at the same time? (Stage 10 / Malone dependency – Simultaneity constraints dependency)
"None"

61. Could you list any task activities of your office which need to be scheduled using a plan? (Stage 10 / Malone dependency – Simultaneity constraints dependency)
"Yes, we have five employees in this office…. Each one have shared and individual tasks. Those tasks are drawn for each one of them in a Business Plan Deployment Pack Contents… You know what I am saying… This plan can also be seen as the schedule of the office."

62. Could you list any task activities of your office which need to be decomposed into sub-activities/sub-goals to be carried out by an individual or a group of individuals? (Stage 10 / Malone dependency – Fit or managing tasks / subtasks)
"e-sourcing, e-collaboration, e-scheduling and e-catalogue"

63. Could list the technology systems and/or equipments which are used in your office? These may include computers, bolts, nuts, telephone, fax machine, computer software, computer systems…etc. (Stage 10 / Technology – Technology systems)
"e-sourcing tool, e-scheduling tool, e-collaboration tool, e-catalogue tool, computers, printers, fax, scanner, telephone, SAP system, lots of I.T. software"

64. Could you list the task activities of your office which require high level of discretion to be carried out? (Stage 12 / Weak or strong situation – Discretion)
"e-sourcing, e-collaboration, e-scheduling, the individuals have delegated authority… whereas, with e-catalogue discretion is much less, you can only choose suppliers that we've made deals that provide the catalogue… you can't go outside… you will be penalised if you ever went and did that… Let me tell you more about e-catalogue… the way these secretaries or people used to order bills, they used to ring up local suppliers, look through local catalogues then pay by credit cards… there is interest in there… isn't it… think of all that different time wasted… do you see… and

look at the credit card bill you gotta pay… So to buy a pen from a Birmingham office might be a different cost to buying a pen from a London office… but now we've got one supplier who does pens for example… you only go to him, no credit cards needed... So it is standardising process basically."

65. Could you list the task activities of your office, which require high skill set and high discretion to be performed and are currently using an objective reward system? If there is not, do you think that these task activities could obtain a reward system? (Stage 12 / Weak or strong situation – Reward system)

"All of the task activities have an objective numerical reward system, but you have to take into consideration that the e-sourcing, e-collaboration and e-scheduling can be unpredictable and complex, I will give an example… a target will be set that 30% of all supplier bids that go out from Rolls Royce to be automated rather than manual using the e-sourcing tool. That is the target, but the target say for example to the e-catalogue will be more because it is less variable than this one. You cannot do 100%... there is no way it's gonna work. So when the objectives are closed out, it depends on what performance factor you get, which is related to your bonus… based on that there is monetary and promotional rewards. They have to hit the target, you set your target at the beginning of the year and your manager will with you, if you do not achieve them, you know what's gonna happen… if you achieve them, its good platform for you to get more money, reward or go to your next level up…
Yearly main assessment for measuring the output and the behaviour of the employees in all task activities, the employees will be appraised or rewarded based on achieving their target"

Appendix K – Model testing interview protocol completed by the manager of the Siemens office

Manufacturing Organisation Research Group, Loughborough,
Wolfson School of Mechanical and Manufacturing Engineering

Siemens Case Study Interview Protocol to Test the Model–

Office Manager

Case Study One

Name of the office and organisation	
Contact person(s)	
Phone:	
Email:	

Seiam Alfadhl
Research Student
Wolfson School of Mechanical & Manufacturing Engineering
Loughborough University
Loughborough
Leicestershire
LE11 3TY

Additional Contact Information:

Mobile: 07816339623

S.S.Alfadhl@lboro.ac.uk

Where necessary additional space is available for further information at the rear

Aim

The aim is to populate the conceptual model shown in Figure (K.1) using this case study. This model is related to redesigning and diagnosing the management systems of your office. This test is carried out to examine if the model practically generates new design recommendations or not.

Background Definitions

- An office: It is a semi-autonomous accountable human group working together with some form of interdependence between them as an organisation both distinct from and a part of the company itself, therefore, the office is possibly part of a larger department, which may be within an even larger organisation that has individuals who work towards a common goal.
- Task activity: It has been defined in this study as a collection or a group of activities that are part of the value stream. In this sense, an office is regarded as a collection of task activities that are carried out by its individuals and are part of the value stream of the organisation. Exemplars of various task activities are taking a particular type of customer order, processing payments etc.

Proposed Conceptual Methodology of implementation

Figure (K.1) shows the steps of the model which will be tested using this case study.

Preliminary stage – initial data collection for variables of the current state of the office (e.g. organisational culture, size, heterogeneity, stakeholders' expectations, hostility, pressure, skill set, financial restrictions, differentiation, constraints of office layout, integration, structure, task complexity, leadership style, organisational effectiveness and business strategy)	**STAGE 1**

Identify all the task activities of the office STAGE 2

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively STAGE 3

Evaluate the perceived uncertainty of each task activity STAGE 4

Evaluate the perceived analysability of each task activity STAGE 5

Identify the type of each task activity carried out in the office – mechanistic or organic task activity STAGE 6

Divide each task activity type in terms of mechanistic or organic STAGE 7

Divide each organic task activity in terms of risk level, this may include: 1) Mechanistic task activities. 2) High risk organic task activities. 3) Low risk organic task activities. STAGE 8

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for mechanistic tasks and high risk organic tasks. 2) Organic system design for low risk organic tasks STAGE 9

Define technology, interdependence & coordination for each task activity of each system design STAGE 10

For task activities of mechanistic flow system design | *For task activities of organic system design*

	STAGE 11	
Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event		**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**
Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set	STAGE 12	**Identify task characteristics for each task activity in terms of variables that influence the office on the task level such as reward system, discretion & skill set. Then label each value stream map based on these characteristics with Weak or Strong tasks & any stakeholders' expectations**
Define other office characteristics or systems related to the office in general: • Centralisation Vs decentralisation – Centralisation in mechanistic • Management control systems – Behavioural in mechanistic • Trust • Decision support system • Formalisation and standardisation – High rules and procedures in mechanistic • Job satisfaction • Creativity • Formal or informal • Gender mix • History of the office	STAGE 13	**Define other office characteristics or systems related to the office in general:** • Centralisation Vs decentralisation – Decentralisation in organic • Management control systems - Output in organic • Trust • Decision support system – High in organic • Formalisation and standardisation – Low rules and procedures in organic • Job satisfaction • Creativity – High in organic • Formal or informal • Gender mix • History of the office
Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	STAGE 14	**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**
Define future state characteristics of variables of stage 10 for each task activity	STAGE 15	**Define future state characteristics of variables of stage 10 for each task activity**
Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	STAGE 16	**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**
Define future state characteristics of the variables of stage 1	STAGE 17	**Define future state characteristics of the variables of stage 1**
Draw future state maps of each task activity drawn in stage 11 using the conventional form of Value Stream Mapping – Team event	STAGE 18	**Draw future state maps of each task activity drawn in stage 11 using the new form of Value Stream Mapping – Team event**
Define future state characteristics of the tasks identified in stage 12 for each of the task activities	STAGE 19	**Define future state characteristics of the tasks identified in stage 12 for each of the task activities**
Define the future state characteristics of the variables or systems identified in stage 13	STAGE 20	**Define the future state characteristics of the variables or systems identified in stage 13**
Prepare a table that lists design recommendations for the office manager in terms of the office seven systems	STAGE 21	**Prepare a table that lists design recommendations for the office manager in terms of the office seven systems**
Cont. Improvements – Draw future Value Stream Maps as needed	STAGE 22	**Cont. Improvements – Draw future Value Stream Maps as needed**

Questions

1. How many people are working in your office? (Stage 1 / Size)

2. Could you describe what customer segment in the market does both your company and your office target? How variable these markets are? (Stage 1 / Heterogeneity)

3. Could you specify the types of readiness levels of various types of people that exist in your office as shown in Table (K.1)? (Stage 1 / Leadership style – Readiness level)

    Table (K.1) illustrates the various types of employees in the office.

Readiness Level	
R1 – Low follower readiness	Relates to followers who are both **unable & unwilling** & who lack motivation & commitment; **OR** who are **unable & insecure**
R2 – Low to moderate follower readiness	Relates to followers who are **unable but willing** & who lack ability but are motivated to make an effort; **OR** who are **unable but confident**
R3 – Moderate to high follower readiness	Relates to followers who are **able but unwilling**, & who have the ability to execute but unwilling to apply their ability; **OR** who are **able but insecure**
R4 – High follower readiness	Relates to followers who are both **able and willing** and who have the ability and commitment to execute; **OR** who are **able and confident**

Source: inferred from (Mullins 2007).

4. Four leadership styles (S1, S2, S3, S4) are derived from the way the leader exhibits various combinations of high or low levels of both task behaviour and relationship behaviour used by the manager to lead various types of people in the office. These leadership styles are shown in Table (K.2). Referring to Table (K.2) could you specify the types of leadership style(s) used by the manager to lead the employees of the office? (Stage 1 / Leadership style)

Table (K.2) illustrates the various styles of situational leadership.

Leadership Style	Characteristics of Leadership Style
S1 – Telling Style	Task Behaviour (↑) & Relationship Behaviour (↓)
S2 – Selling Style	Task Behaviour (↑) & Relationship Behaviour (↑)
S3 – Participating Style	Task Behaviour (↓) & Relationship Behaviour (↑)
S4 – Delegating Style	Task Behaviour (↓) & Relationship Behaviour (↓)
Definitions	
Task Behaviour: It is the amount of guidance or direction a leader gives to the subordinates by setting up goals for them and defining their roles and how to perform them (i.e. telling them what to do, when to do it and how to do it).	
Relationship behaviour: It is also called supportive behaviour; It is the amount of social backup a leader gives to the subordinates in a two-way communication, by listening to them and offering them support and encouragement.	

Source: inferred from (Mullins 2007, Huczynski, Buchanan 2007).

5. Could you list any major stakeholders who influence the office? If there is any, how does each influence the office (Stakeholders' expectations)

6. What do the customers of your office expect? (Stage 1 / Stakeholders' expectations)

7. What is the purpose of this office? And how is it set? (Stage 1 / Organisational effectiveness and strategy, Stage 3 / System 5 – VSM)

8. Does your office tend to be unpredictable to the point where it requires flexibility and discretion to handle it? Or does it tend to be predictable to the point where it can be handled by having rigid controls, rules and orders? (Stage 1 / Organisational culture – Competing Values Framework)

9. Does the focus in your office tend to be internal by having an emphasis on the way people achieve unity and collaboration between them whilst carrying out their tasks? Or does the focus in your office tend to be external by having an emphasis on achieving a competitive advantage through the availability of the right resources and structure? (Stage 1 / Organisational culture – Competing Values Framework)

10. Figure (K.2) represents the four quadrants of the competing values framework. In addition, Figure (K.3) illustrates more detail on the four framework types in terms of its culture, effectiveness, leadership and value drivers. Could you select the framework type that most applies to your office? (Stage 1 / Organisational culture – Competing Values Framework)

Figure (K.2) shows the four quadrants of the competing values framework.
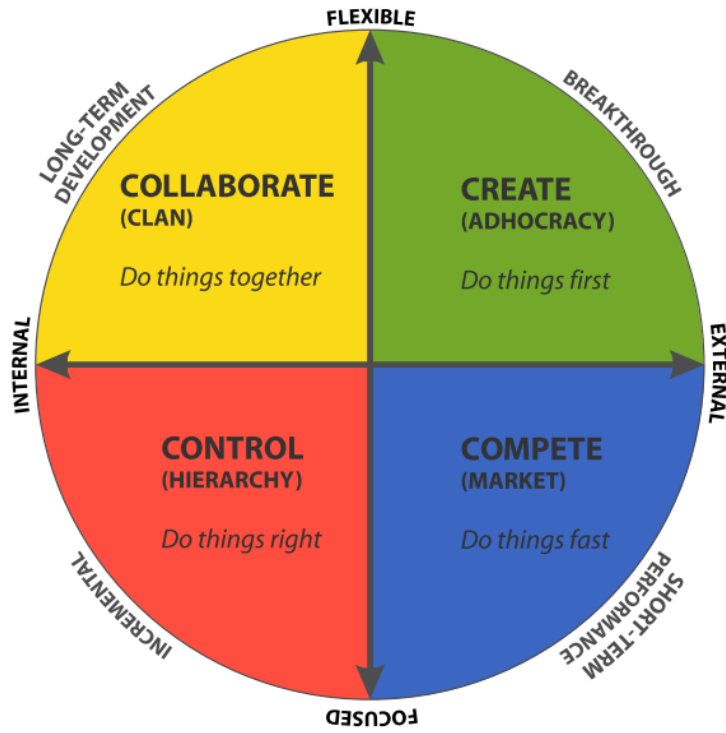
Source: (Cameron 2009).

Figure (K.3) illustrates more details on the various competing values frameworks that may exist in your office.

Long-term Change		Individuality Flexibility		New Change
Culture Type:	CLAN		Culture Type:	ADHOCRACY
Orientation:	COLLABORATE		Orientation:	CREATE
Leader Type:	Facilitator Mentor Teambuilder		Leader Type:	Innovator Entrepreneur Visionary
Value Drivers:	Commitment Communication Development		Value Drivers:	Innovative outputs Transformation Agility
Theory of Effectiveness:	Human development and high commitment produce effectiveness.		Theory of Effectiveness:	Innovativeness, vision, and constant change produce effectiveness.
Internal Maintenance				**External Positioning**
Culture Type:	HIERARCHY		Culture Type:	MARKET
Orientation:	CONTROL		Orientation:	COMPETE
Leader Type:	Coordinator Monitor Organizer		Leader Type:	Hard-driver Competitor Producer
Value Drivers:	Efficiency Timeliness Consistency & Uniformity		Value Drivers:	Market share Goal achievement Profitability
Theory of Effectiveness:	Control and efficiency with capable processes produce effectiveness.		Theory of Effectiveness:	Aggressively competing and customer focus produce effectiveness.
Incremental Change		Stability Control		Fast Change

Source: (Cameron 2009).

11. Could you list the cultural values held by the people of your office? (Stage 1 / Organisational culture – Shared values)

12. How do you think that your office employees are likely to resist change in work arrangements? Why? (Stage 1 / Organisational Culture – Weak or strong culture)

13. What do you think of the people beliefs and general values in your office with respect to change? (Stage 1 / Organisational Culture – weak or strong culture)

14. Does your office tends to have a known set of cultural values or beliefs or does it tend to have no identifiable culture? (Stage 1 / Organisational culture – shared values)

15. Could you describe how competitive the market your office is providing services or products for? (Stage 1 / Hostility)

16. Could you roughly describe the percentage of time when people are working compared to the percentage of time when people are not working in this office? (Stage 1 / Pressure)

17. Could you describe the level of variety and complexity existing in the tasks of the office? (Stage 1 / Task complexity)

18. Could you describe the skills of the employees which are required in your office? How often do you receive training? (Stage 1 / Skill set, Stage 12 / Skill set)

19. Could you describe if there are any financial constraints related to the redesign, capacity or future developments of the office? (Stage 1 / Financial restrictions)

20. On what basis are your offices or departments grouped? For instance is the grouping in terms of specialists of different departments, subunits or sections? (Stage 1 / Differentiation)

21. Could you describe your office layout briefly? Is there any physical constraints? (Stage 1 / Constraints of office layout)

22. In the box provided in Figure (K.4) below, the analyst is going to draw the layout of the office by his/her own observations: (Stage 1 / Constraints of office layout)

Figure (K.4) illustrates a box where the layout of the office roughly is drawn by the analyst.
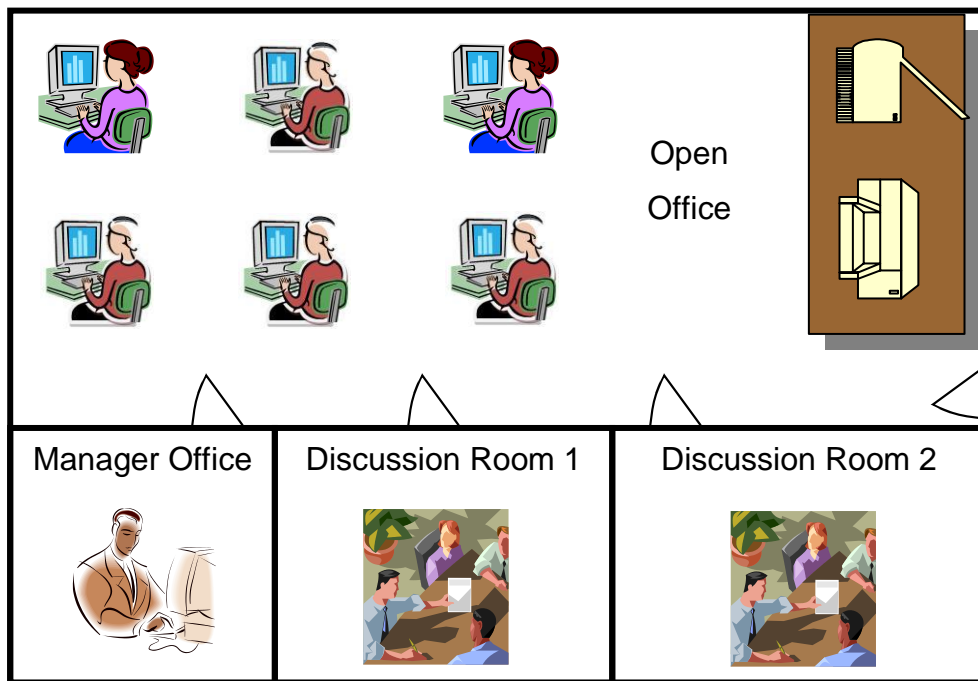
23. Do the demands of the environment oblige your office to have high level of collaboration with other units in the organisation? If yes could how important it is to be connected to other people in your office? (Stage 1 / Integration)

24. Could you describe the needed level of alignment between the office goals and the organisation's goals? (Stage 1 / Integration)

25. In the box provided in Figure (K.5) below, the analyst is going to draw the structure of the office by his/her own observations: (Stage 1 / Structure)
Figure (K.5) illustrates the structure of the office drawn by the analyst.
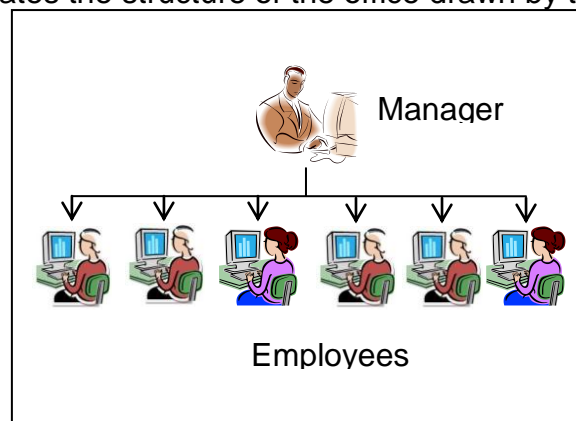
26. Could you list the task activities of the office and state the percentage of each in relation to the other tasks of the office? Could you relate the percentage of each to the Lucas concept of runners, repeaters and strangers? Runners are the tasks that are most carried out in the office. Repeaters are the ones that are repeated often in the office and the strangers are ones that are rarely carried out in the office (Lucas Mini Guide 1991) (Stage 2 / Task activities of the office)

27. Could you explain briefly how the work is allocated and coordinated for different people in your office? For instance does every worker have his own unique task or do they have tasks in common? (Stage 3 / VSM – System 2)

28. How do you do your job? (Stage 3 / VSM – System 2, Stage 10 – Technology & interdependence)

29. Could you explain how the work and projects are planned in your office to deliver the office's products or services? (Stage 3 / VSM – System 3)

30. Could you list any form(s) of management control systems used to measure people in your office such as output and behavioural controls… etc? (Stage 3 / VSM – System 3*, Stage 13 / Management control systems)

31. Could you describe how your office receives information that may change, modify or improve the way the activities and tasks of the office are carried out? And who receives it? (i.e. such as continuous feedback on marketplace conditions, technology changes, other external factors etc.) (Stage 3 / VSM –System 4)

32. Are there any task activities that do not add value to the office? (Stage 3 / VSM)

33. What are the uncertainties of your task inputs that your office face? For instance are these inputs variable, predictable, unpredictable…etc? (Stage 4 / Task uncertainty – Input environmental uncertainty)

34. Does your office experience any pressure to conform to rules or procedures from external parties such as regulatory agencies, governments or scientific and technical communities? If yes, who are they? And how often do their rules change? (Stage 4 / Task uncertainty – Input environmental uncertainty)

35. What are the uncertainties of your task operations that your office face? (Stage 4 / Task uncertainty – Task operation uncertainty, Stage 10 Thompson's technology)

36. Do any of the technologies used in your office create uncertainty? If yes, could you mention how this technology would create uncertainty? And could you provide with examples? (Stage 4 / Task uncertainty – Task operation uncertainty)

37. Roughly, could you draw and comment in the space provided below the curve that represents how variable is the customer demand over a reasonable period of time? (Stage 4 / Task uncertainty – Customer demand uncertainty)
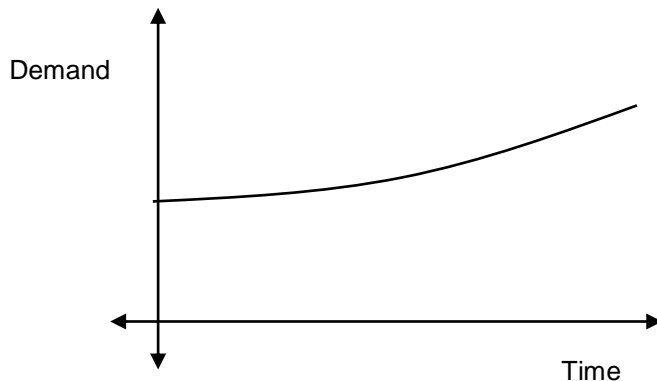
38. What are the uncertainties of your task outputs that your office face? (Stage 4 / Task uncertainty – Dynamism)

39. Does processing the tasks of your office involve expected problems which can be solved using standardised solutions, or does it involve unexpected problems, which requires judgements, experience or intuition of the employees to be solved? If your office involves the former, could you describe how analysable the tasks of your office are and how easy it is to break down the tasks into a detailed sequence of standard operating procedure? (Stage 5 – Task analysability)

40. Is there any task activity(s) in your office that consists of at least one organic task, which requires high levels of both discretion and skill set to be carried out? Which task activities are these? (Stage 6 – organic or mechanistic task activity)

41. Could you categorise each task activity in terms of mechanistic or organic? (Stage 7 – Divide each task activity in terms of organic or mechanistic)

42. How critical is it that your office output or procedures are carried out correctly, for instance in terms of failure in meeting orders in time, hygiene, quality, customer needs or cost? (Stage 8 / Risk)

43. What the risk of failure in the tasks is as explained in the previous question? (Stage 8 / Risk)

44. Are there any risks related to equipments or procedures associated with health and safety, for instance chemical reactions, chemical specimens…etc, in your office? (Stage 8 / Risk)

45. Are there any task activities in the office that may have high risk tasks that could cause a threat to the lives of others or to the viability of the organisation? (Stage 8 / Risk)

46. Could you group each task activity in terms of a mechanistic flow system design and an organic system design? (Stage 9 / Risk)

47. Figure (K.6) illustrates the basic elements of a task.

| Task inputs | → | Task operation | → | Task Outputs |
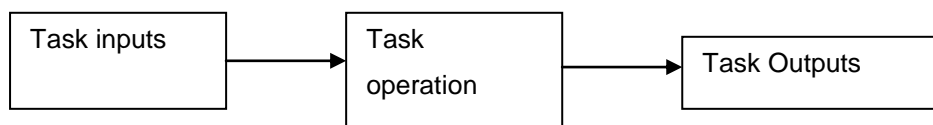
It is considered in this study that the sources of task uncertainty come from inputs uncertainties, task operation uncertainties and output uncertainties. Relating to Figure (K.6), where does the input to your office comes from? (Stage 10 / Interdependence and Technology)

48. What do you do when you finish your job and where does your output go? (Stage 10 / Technology and Interdependence)

49. Who are the customers of your office? (Stage 10 / Interdependence and Technology)

50. What technologies and/or equipments are used in your office? For instance: computers, bolts, nuts, telephone. Fax…etc? (Stage 10 / Technology)

51. Figure (K.7) illustrates different types of offices in terms of the way various units interact with each other. In more details, the circles resemble a particular unit such as people, offices, departments or companies. The arrows resemble the direction of communication between these units. In other words, these diagrams resemble different work arrangements as well as their associated coordination mode:

Figure (K.7) illustrates various types of interactions that may exist in your office
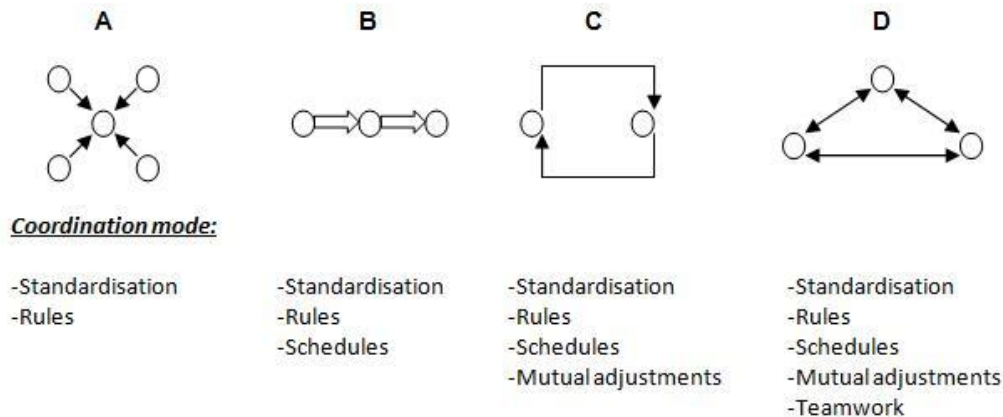
Referring to Figure (K.7), roughly choose the suitable office work arrangement that would fit the task activities of your office? (Stage 10 / Technology, coordination and Interdependence)

52. Do you think that you have high level of discretion in deciding how to do your work in your office? (Stage 12 / Discretion)

53. Could you describe briefly how much discretion in taking decisions do you have for each of the task activities of your office? (Stage 12 / Discretion, Stage 13 / centralisation Vs decentralisation)

54. Is there any employees reward system for any task activity of your office? If yes, could you specify which task activity and describe its reward system? (Stage 12 / Reward system)

55. How are the people controlled and measured in your office? (Stage 13 / Management control systems)

56. How do you know when people have done a good job or a bad job? In other words how people are measured? (Stage 13 / Management control systems)

57. How do people interact in doing their work and socially within your office, for instance: how official, formal or informal is it? Do they trust each other? (Stage 13 / Formal or Informal and Trust)

58. Do you use any technologies aimed to only offer helpful information to the managerial decision making process? If yes, please describe it? (Stage 13 / Decision Support System)

59. Does your office have a high level of standardisation for the method by which each task is carried out? Does it have a high level of rules, standards and procedures? (Stage 13 / Formalisation and standardisation)

60. What improvements could be done to your job? Are the employees satisfied with their jobs in the office? (Stage 13 / Job satisfaction)

61. How significant is your office / department to overall organisation? For instance is it central and cannot be outsourced or trivial and can be outsourced to other companies? (Stage 13 / Job satisfaction)

62. How friendly are the people in your office? (Stage 13 / Job satisfaction)

63. Do you require the workers to have a high level of creativity while carrying out their job? If yes, could you describe how are you promoting creativity in the office? (Stage 13 / Creativity)

64. Could you give rough estimates on the ratio of men to women in your office? Is there any gender bias in favour of men in any organisational working practices (e.g. Recruitment, career advice, career development or general attitudes of the men), which may require the women to demand more support? (Stage 13 / Gender Mix)

65. Could you explain the general tenure of people in the office? Do people feel secure with their jobs? (Stage 13 / History of the office)

Appendix L – Direct observations protocol employed to test the model using the Rolls Royce and Siemens case studies

Observed Issues – Model Testing Phase

Interaction with the customers: it's all done over phone or internet, so observations could not be taken.

1. Understanding the nature of interaction with customers.

2. The factors considered while handling customers.

3. The procedures followed or carried out to handle their query.

Physical environment:

1. Physical layout of the office

2. Physical restrictions

3. Technology systems used

4. Employees surveillance used

General atmosphere:

1. Number of people.

2. Understanding interactions among individuals.

3. The managers' visits and their activities during the visits.

4. The rules and procedures.

5. The interdependence between them.

6. If they communicate with each other in a formal or informal way.

7. If the work atmosphere is stressful or pleasant.

8. Is the manager available informally or not? Are there any group meetings in discussion rooms?

9. Shared values – any collaboration, team work… etc?

10. Do they tend to be under constant pressure and busy all the time?

11. Do the people seem to be positive and full of energy within the office?

Appendix M – Rolls Royce case study database

Date	Description	Format	Source	Role
2/3/2006	Transcripts of semi-structured in-depth interview carried out to test & follow the model steps	Recorded digitally	The manager of the office	Office manager
2/3/2006	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
8/3/2006	Value Stream Maps drawn during group interview	Recorded digitally	The office manager along with a sample of regular employees of the office selected by the manager	Internal consultants and their manager
8/3/2006	Minutes of observations carried out while drawing Value Stream Maps	Manually noted minutes	Directly Observing interaction & listening to topics discussed	
13/9/2010	Transcripts of Semi-structured in-depth interview carried out to validate the model and its findings	Recorded digitally	The manager of the office	Office manager

Appendix N – Siemens case study Database

Date	Description	Format	Source	Role
14/12/2005	Transcripts of semi-structured in-depth interview carried out with 1st manager to test & follow the model steps	Recorded digitally	1st manager of the office	Office manager
14/12/2005	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
11/1/2006	Transcripts of semi-structured in-depth interview carried out with 2nd manager to test & follow the model steps	Recorded digitally	2nd manager of the office	Office manager
11/1/2006	Minutes of observations carried out in the office	Manually noted minutes	Directly Observing the office under normal working conditions	
25/1/2006	Value Stream Maps drawn during group interview	Recorded digitally	The office manager along with a sample of regular employees of the office selected by the manager	Internal consultants and their manager
25/1/2006	Minutes of observations carried out while drawing Value Stream Maps	Manually noted minutes	Directly Observing interaction & listening to topics discussed	
2/2/2006	Value Stream Maps drawn during group interview	Recorded digitally	The office manager along with a sample of regular employees of the office selected by the manager	Internal consultants and their manager
1/7/2010	Transcripts of Semi-structured in-depth interview carried out to validate the model and its findings	Recorded digitally	The manager of the office	Office manager

Appendix O – Model testing and validation case study protocol

Introduction to Case Study and Action Research

Testing and Validation Phase Rationale

The testing and development of the conceptual model of this study can be done using multiple case study design of two case studies, which can enable replication as well as enhance the theoretical generalisability of the findings. In addition, action research was also used to test a combination of a new generation of value stream mapping along with the conventional form of value stream mapping to map the various task activities of the office. The reason why case study design was used: 1) Case study is suitable when there are too many variables which are difficult to quantify (Bonoma 1985, Yin 2003) such as many of the variables used in this study including task uncertainty, task interdependence, task complexity etc. Furthermore, Yin (2003) argues that case studies are used to understand more fully the nature of the relationship between the organisational variables, real-life events and small group behaviour. In addition, case studies are more rigorous in operations management over other positivist methods such as statistical modelling and optimisation techniques and simulation (Meredith 1998). Moreover, case studies provides for a thorough interpretation of the "how and why" research questions (Meredith 1998).In addition, understanding a phenomenon through triangulation, where different sources of data collection provides an opportunity to cross-check the evidence, is one of the main goals of using case study research (Meredith 1998). Furthermore, case study research must seek to build a theory (Bryman, Bell 2007, Voss, Tsikriktsis et al. 2002, Stuart 2002, McCutcheon, Meredith 1993). Moreover, Case study research is suitable for operations management studies, as they usually include causal and time-dependent relationships that are needed to be understood using evidentiary chain (Stuart 2002). In addition, case study research provides tools and techniques, which can compare between variables and characteristics across organisations (Stuart 2002).

Objectives of the Case Studies and Action Research

The objectives of conducting this empirical phase are:

• To test and refine the conceptual model, which was developed from the literature review and the pilot studies phase, as part of building a theory through multiple case study design.

• To carry out final validation for the tested model, to produce the final version of model of this study.

Chosen Case Studies

As this model testing phase is ultimately used as part of a theory building from case study research, theoretical sampling has been used to select the type of case studies for theoretical reasons rather than statistical reasons as advocated by Glaser and Strauss (1967). The choice of the cases was focused towards selecting cases of an extreme situation (Pettigrew 1990, Huberman, Miles 2002), which is a form of extreme case sampling technique (Creswell 2004, Patton 2002) that can provide transparently observable phenomena of interest (Pettigrew 1990, Huberman, Miles 2002). Consequently, both case studies were chosen to be organic offices for few reasons. This choice was also mainly influenced by the aim of this research project, research questions and proposition as well as other constraints as advocated by Rowley (2002). The choice of two organic offices as cases was found to be congruent with aim of this of this study (i.e. testing the new generation of value stream mapping that can map organic task activities) by answering research question four. Also, this choice allowed the use of literal replication logic in order to find out if testing the model using two cases exhibiting similar organic characteristics would produce replicated results or not. If the case studies produce replicated results, it means that they supported the model of this study as advocated by Yin (2003).

Case Study and Action Research Questions

Research Question 3 (RQ3): How can an office be redesigned / diagnosed in terms of each of its main management systems with the aim of making it leaner and more effective?

Research Question 4 (RQ4): How can organic task activities, which tend to be complex, uncertain and unanalysable, be mapped using a new version of Value Stream Mapping?

Data Collection and Field Procedures

Initial Contact Person

The access was arranged through two established contacts, each manager in each research who also in introducing my research to the workers in the office. This was followed by an explanation of the problems to be studied and the development of a case study design with the manager and relevant workers of the office. Getting approval from the manager of each office, provided entrance to the sites, helped in locating people for additional information and assistance, helped in carrying out the interviews as well as observations and helped in identifying aspects to study and focus on during the interviews.

Main Study

Research sites visits (3-4 visits) were arranged for each research site, based on the availability of the employees in the research sites for an average of three months. The data collection techniques used was:

• Non participative direct observation took place for each office by the aid of an observation protocol, after finding out from the gatekeepers the best time, were all employees are present and working under regular conditions.

• Interviews by selecting interviewees according to the job roles of interest, which were communicated to gatekeepers who selected the needed individuals, however, because this tool going to be mainly used by the manager, then the

manager only was interviewed to go through the various stages of the model. These interviews were semi-structured and in-depth. The second interviews were group interviews which aimed to draw the value stream map using action research.

Information Sought	Projected Outcomes	Applicable to
Going through the various stages of the model • What are the characteristics of independent variables? • What are the characteristics of control variables? • What are the main task activities of the office? • What is the classification of each task activity in terms of mechanistic, organic and risk? • What are the characteristics of the dependent variables of the office?	To verify if the general flow of the model is correct. To identify if the questions used to evaluate each variable are practical. To test these stages practically	• Manager of each office
Value stream maps of various task activities of the office • How does new generation of value stream mapping look like for each organic task activity?	To test the conceptual new generation of value stream mapping for mapping organic task activities	• Manager & selected employees in each office
Inspecting the office in terms of the Viable System Model • Does the office have all five Viable System Model systems?	To improve the validity of the model by cross checking its system using well-established and well-validated tool such as the Viable System Model	• Manager of each office.
Validating the model • What does the manager think of the model and its findings? • Does the manager recommend any changes to the model?	To carry out a final validation on the tested model, which will result in a final form of the model	• Manager of the office

Data Sources

Data table was constructed to identify the precise source of information from each research site required to answer the research questions and gather the required information. This data table was given to gatekeepers (i.e. the manager) at each

research sites to ensure that the people are going to be capable of giving the information required for this research project.

Data set	Case 1 (Siemens)	Case 2 (Rolls Royce)	Outcomes	Research Question
Interviews	Manager	Manager	To test the model by evaluating its various stages as well as identifying any needed modifications related to the model such as its general flow, its stages, its variables etc	RQ3
	Manager & employees needed to draw the value stream maps	Manager & employees needed to draw the value stream maps	To test the conceptual new generation of value stream mapping by mapping organic task activities. This involves the identification of any modifications related to this new generation, its shape, its variables etc	RQ4
	Manager & employees needed to draw the value stream maps		To empirically identify the list of variables needed to characterise offices and the design process of their management systems. In addition to identify the main themes of the office needed to characterise offices and the design process of their management systems	RQ4
	Manager	Manager	To identify the final shape of the model by carrying out a final validation on the tested model	RQ3,RQ4
Direct Observation	Physical environment	Physical environment	Understanding the physical layout of the office, any physical restrictions, the technology systems	RQ3
	General atmosphere	General atmosphere	Number of people, understanding interactions among individuals, managers' visits and their activities during the visits, the rules and procedures, the frequency of the interaction between others, the interdependence between them, if they communicate with each other in a formal or informal way, and if the work atmosphere is stressful or pleasant.	RQ3
Documents	Catalogue	Catalogue	Gain general understanding about the firms and the market they operate in	RQ3
	Internal report – value stream map drawing		Gain understanding of how they draw the conventional form of values stream mapping	RQ4
		Internal report – Business process deployment package	Gain understanding how each employee has a plan that shows their targets, goals and strategy to achieve them	RQ3
		Internal report – Request for quote report	Gain understanding of how this task activity this carried out	RQ3

Outline of Case Study Report

Data Analysis Methodology

The data collection techniques used in the first case study (i.e. Siemens case study) was purely qualitative. As a result, the qualitative analysis type used was quasi-quantification by using terms such as 'frequently', 'many', 'some, 'a little', 'often' and 'rarely' etc advocated by Bryman and Bell (2007). In this analysis method, these terms were used to enable the researcher to make allusions to quantity (Bryman, Bell 2007). However, after using this type of analysis for the first case studies, it was found that the analysis of this case study was very subjective. Consequently, it was

considered wise to introduce more objective measures within the qualitative research. This was done by changing the data collection method to mixed methods, which was still predominantly qualitative with quantitative methods used whenever possible. Therefore, an attempt was made to measure the semantic differential scale quantitatively unless it was not possible to do so depending on the nature of semantic terms (i.e. whether they are quantifiable or not) (Harasym, Boersma et al. 1971). On the other hand, the entire semantic differential scales were analysed quantitatively using numbers. In some occasions this quantitative analysis required statistical calculations of the averages (e.g. calculation of task uncertainty level); however it was unnecessary in others, because one respondent was used to answer each scale. In addition, the results of both the first and second case studies were presented in tabular format, which was then used to show any emerging patterns and for cross case comparison purposes. In addition, findings of the literal replication were discussed.

Write-up Format

Each individual case was presented by itself, and then cross-case analysis of the findings of the cases was carried out in a less detailed way to provide insight about the model and any modification that can be done to it. A discussion about variables that were excluded from the model was done. In addition a discussion about any changes to the model such as its flow or any of its steps were also discussed.

Appendix P – Interview protocol, completed by the managers of Rolls Royce and Siemens, to validate the model

An example of the interview protocol completed by the manager of Rolls Royce is

presented below:

Manufacturing Organisation Research Group, Loughborough,
Wolfson School of Mechanical and Manufacturing Engineering

Rolls Royce Case Study Interview Protocol to Validate the Model– Office Manager

Validation using the 2nd case study

Name of the office and organisation	Exostar Team, e-procurement Department, Rolls Royce
Contact person(s)	Confidential
Phone:	Confidential
Email:	Confidential

Seiam Alfadhl
Research Student
Wolfson School of Mechanical & Manufacturing Engineering
Loughborough University
Loughborough
Leicestershire
LE11 3TY

Additional Contact Information:
Mobile: 07861378857
S.S.Alfadhl@lboro.ac.uk

Where necessary additional space is available for further information at the rear

Aim of the Interview Protocol

The aim is to validate the model shown in Figure (P.1) using the opinion of the manager of the Rolls Royce case study which was applied to test the model. This validation focuses on identifying the usefulness, novelty, benefits, weaknesses and strengths of the model and its findings.

Aims and Benefits of the Model/Tool

The aim of the tool is to **redesign or diagnose** the office by its **manager** for the aim of increasing the office **effectiveness**, **viability** and **leanness**. The benefits of the model are:

1. Effectively design the office by its manager.
2. Allow the manager to diagnose major aspects of the office (leadership, culture, organisation, planning, employee support, employee assessment and technology), which had a great deal of attention by various renowned organisational design models (e.g. Viable System Model, Galbraith Star Model & McKinsey 7-S Model).
3. Design the office in terms of 7 systems (leadership, culture, organisation, planning, employee support, employee assessment and technology), each one is considered to fulfil a purpose in the office.
4. Introduce continuous improvements, which offer tangible benefits to the new design by using value stream mapping – eliminating waste and improving processes.
5. Create a new form of Value Stream Mapping along with the traditional form. The aim of the new form is to map organic tasks (i.e. tasks that tends to be complex, uncertain & unanalysable), which cannot be mapped using the traditional form of Value Stream Mapping.

Overall Design Recommendations – Rolls Royce

The design recommendations of the office are going to be developed in terms of seven office management systems shown in the mind map of the model (i.e. methodology of implementation) of this study. These design recommendations are done in terms of two audiences. The first audience is the managers of the offices, and the second audience is the academic examiners. The characteristics of the current state as well as the recommendations for the future state of the office are presented in a tabular format. Consequently, two tables were listed, one for the current state and one for the recommendations of the future state. Each one of those table has two columns for the industrial and the academic audiences. Tables (1 & 2) illustrate a description of the current state and the recommendations for the future states of the office respectively.

The Model of this Study

Figure (P.1) shows the final version of the tested model of this study.

Variables (A-1): variables identified initially from the office current state to initiate the process (e.g. organisational culture, heterogeneity, stakeholder' expectations, skill set, financial restrictions, constraints of office layout and structure) — STAGE 1

Identify the level of task complexity — STAGE 2

Identify the No. of workers needed to populate the various stages of model based on the task complexity level — STAGE 3

Variables (A-2): Identify variables initially from the office current state (e.g. leadership style, organisational effectiveness & business strategy) – Team event — STAGE 4

Identify all the task activities of the office – Team event — STAGE 5

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively — STAGE 6

Evaluate the perceived uncertainty of each task activity — STAGE 7

Evaluate the perceived task analysability of each task activity — STAGE 8

The effect of evaluating levels of task uncertainty & task analysability by relying on the subjective opinion of the manager is reduced by evaluating each based on the opinions of a group of respondents – Team Event — STAGE 9

identify the type of each task activity carried out in the office (i.e. mechanistic or organic) – Team event — STAGE 10

Divide each task activity type in terms of mechanistic or organic — STAGE 11

Divide each task activity in terms of risk level, this may include: 1) High risk mechanistic task activities. 2) Low risk mechanistic task activities. 3) High risk organic task activities. 4) Low risk organic task activities – Team event — STAGE 12

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for low risk mechanistic tasks & high risk organic tasks. 2) Organic system design for high risk mechanistic tasks & low risk organic tasks — STAGE 13

Variables (B): variables identified the characteristics of the method used to produce the output of each task activity such as technology & interdependence. They are identified for each task activity of each system design – Team event — STAGE 14

For task activities of mechanistic flow system design

For task activities of organic system design

Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event — STAGE 15 — **Draw current state maps of these task activities using new form of Value Stream Maps – Team event**

Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set — STAGE 16 — **Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set – each value stream map is labelled with both weak or strong & any stakeholders' expectations**

Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office — STAGE 17 — **Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**

Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event — STAGE 18 — **Define characteristics of the dependent variables (B) needed to develop the method used to produce the output of each future state value stream map – Team event**

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively — STAGE 19 — **Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**

Define characteristics of the independent variables (A-1 & A-2) needed to develop the office future state (Note: Evaluating variables (A-2) requires a team event) — STAGE 20 — **Define future state characteristics of the independent variables (A-1 & A-2) - Evaluating variables (A-2) requires a team event**

Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event — STAGE 21 — **Draw future state maps of each task activity drawn in stage 13 using the new form of value stream mapping – Team event**

Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14 — STAGE 22 — **Define future state characteristics of the dependent variables (C) for each of the task activities of stage 14**

Prepare a table listing design recommendations for the office manager in terms of the office seven systems — STAGE 23 — **Prepare a table listing design recommendations for the office manager in terms of the office seven systems**

Continuous Improvements – Draw future Value Stream Maps as needed — STAGE 24 — **Continuous Improvements – Draw future Value Stream Maps as needed**
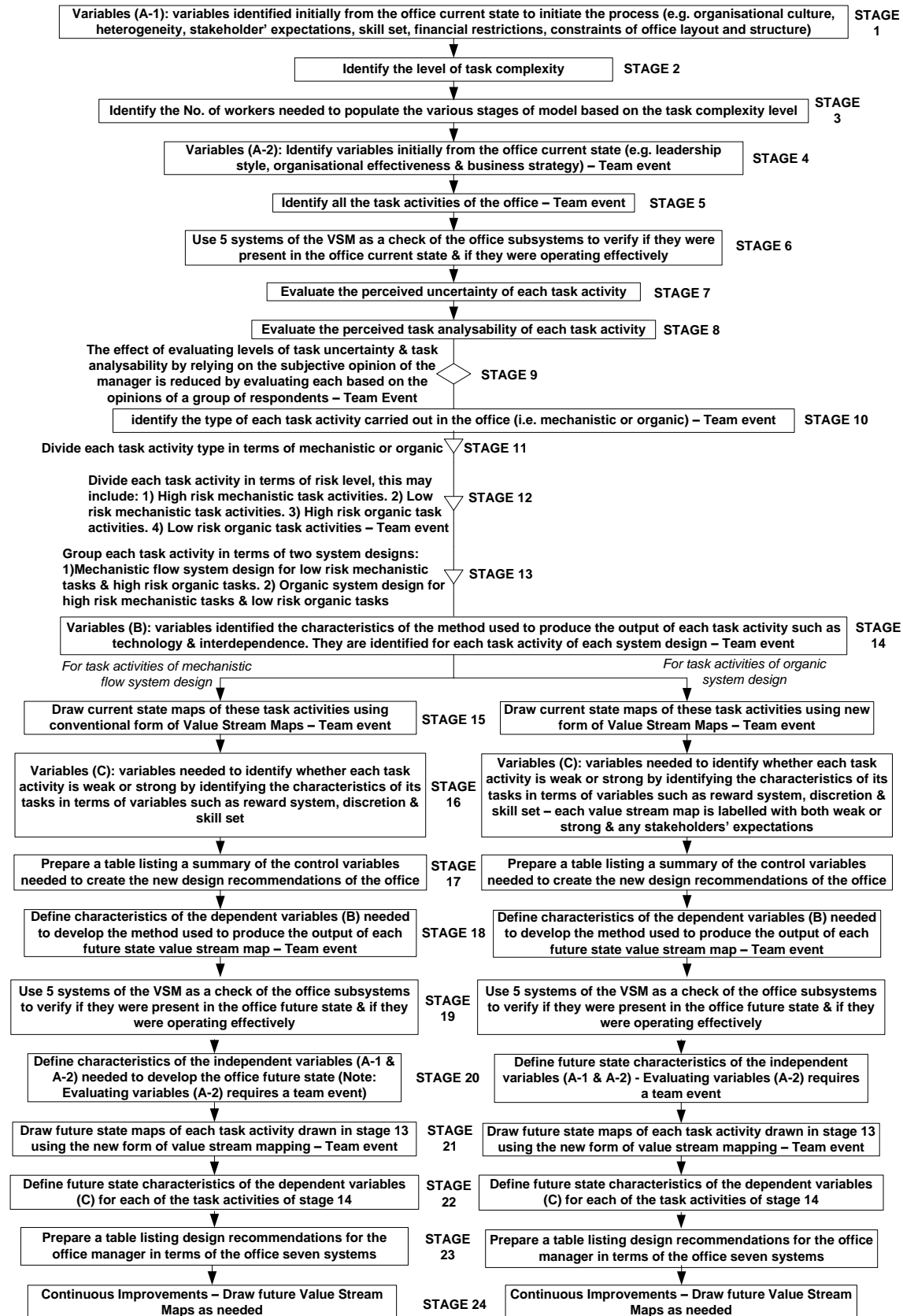
Figure (P.2) shows an improved version of the model that was tested and populated using the Rolls Royce case study.

Variables (A): variables identified initially from the office current state to initiate the process (e.g. organisational culture, heterogeneity, stakeholders' expectations, skill set, financial restrictions, constraints of office layout, structure, task complexity, leadership style, organisational effectiveness and business strategy)	**STAGE 1**

Identify all the task activities of the office	**STAGE 2**

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office current state & if they were operating effectively	**STAGE 3**

Evaluate the perceived uncertainty of each task activity	**STAGE 4**

Evaluate the perceived task analysability of each task activity	**STAGE 5**

Identify the type of each task activity carried out in the office – mechanistic or organic task activity	**STAGE 6**

Divide each task activity type in terms of mechanistic or organic   STAGE 7

Divide each organic task activity in terms of risk level, this may include: 1) Mechanistic task activities. 2) High risk organic task activities. 3) Low risk organic task activities.   STAGE 8

Group each task activity in terms of two system designs: 1)Mechanistic flow system design for mechanistic tasks and high risk organic tasks. 2) Organic system design for low risk organic tasks   STAGE 9

Variables (B): variables identified from the characteristics of the method used to produce the output of each task activity such as technology & interdependence. They are identified for each task activity of each system design	**STAGE 10**

For task activities of mechanistic flow system design | *For task activities of organic system design*

Draw current state maps of these task activities using conventional form of Value Stream Maps – Team event	**STAGE 11**	**Draw current state maps of these task activities using new form of Value Stream Maps – Team event**

Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set	**STAGE 12**	**Variables (C): variables needed to identify whether each task activity is weak or strong by identifying the characteristics of its tasks in terms of variables such as reward system, discretion & skill set – each value stream map is labelled with both weak or strong & any stakeholders' expectations**

Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office	**STAGE 13**	**Prepare a table listing a summary of the control variables needed to create the new design recommendations of the office**

Define future state characteristics of variables (B) needed to develop the method used to produce the output of each task activity – Team Event	**STAGE 14**	**Define future state characteristics of variables (B) needed to develop the method used to produce the output of each task activity – Team Event**

Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively	**STAGE 15**	**Use 5 systems of the VSM as a check of the office subsystems to verify if they were present in the office future state & if they were operating effectively**

Define future state characteristics of variables (A)	**STAGE 16**	**Define future state characteristics of variables (A)**

Draw future state maps of each task activity drawn in stage 11 using the conventional form of value stream mapping – Team event	**STAGE 17**	**Draw future state maps of each task activity drawn in stage 11 using the new form of value stream mapping – Team event**

Define future state characteristics of variables (C) for each of the task activities of stage 12	**STAGE 18**	**Define future state characteristics of variables (C) for each of the task activities of stage 12**

Prepare a table listing design recommendations for the office manager in terms of the office seven systems	**STAGE 19**	**Prepare a table listing design recommendations for the office manager in terms of the office seven systems**

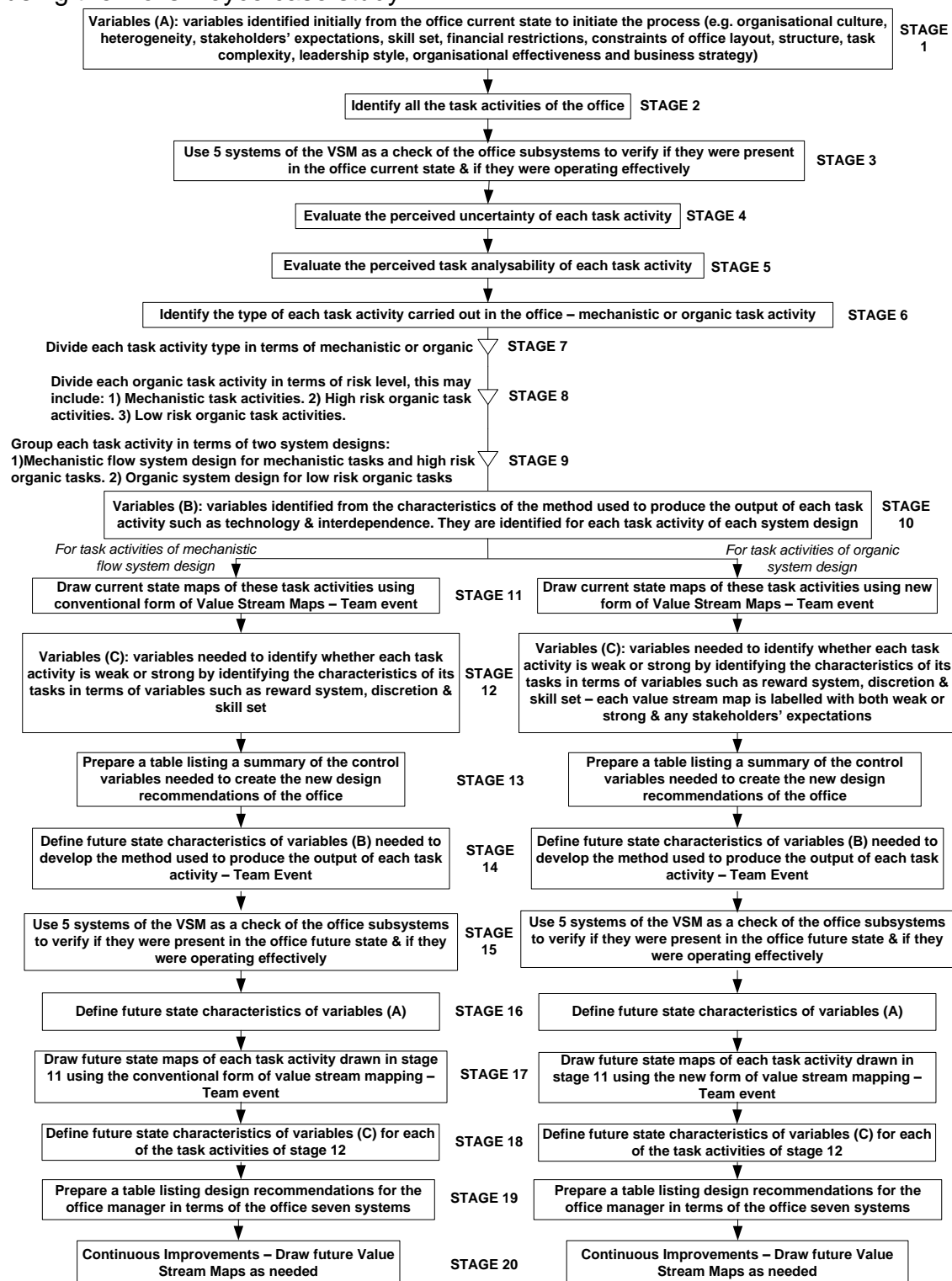|		
Continuous Improvements – Draw future Value Stream Maps as needed	**STAGE 20**	**Continuous Improvements – Draw future Value Stream Maps as needed**

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Table (P.1) illustrates the current state of the seven management systems of the office represented in terms of both industrial and academic perspectives.

Industrial Audience	Academic Audience
1. Current Leadership Style	
The manager leads the employees by: • Giving them a low amount of guidance or direction in terms of telling them what to do, when to do and how to do it. • Giving them a high amount of social backup & support by encouraging & listening to them.	The situational leadership style: The situational leadership style used in the current state of the office is participating (S3) situational leadership style.
2. Current Technology Characteristics	
Technology systems: e-sourcing tool, e-scheduling tool, e-collaboration tool, e-catalogue tool, SAP system, lots of I.T. software… etc The production method used to process: • e-sourcing, e-collaboration & e-scheduling is accomplished using a variety of techniques, skills & resources, but the choice, combination & order of application are decided by feedback from the object itself. • e-catalogue is linear and involves a series of activities or programmed tasks that are arranged sequentially and carried out in a pre-determined order.	Thompson's Technology Type: • Intensive type for the e-sourcing, e-collaboration & e-scheduling. • Long-Linked for the e-catalogue.
3. Current Employee Support	
The products and services of the office are variable.	Heterogeneity: The products & services of the office are heterogeneous.
The task activities are classified in terms of two characteristics: • e-sourcing, e-scheduling and e-collaboration may not have an objective rewards system & employees have high skill set & high discretion as it is unpredictable. • e-catalogue may have an objective reward system, and employees have low skill set and low discretion as it is predictable.	Weak/Strong Situations: • e-sourcing, e-scheduling and e-collaboration are weak task activities. • e-catalogue is a strong task activity.
e-sourcing, e-scheduling and e-collaboration task activities are complex.	Task Complexity: e-sourcing, e-scheduling & e-collaboration task activities are complex.
The task activities are classified in terms of two characteristics: • e-sourcing, e-collaboration & e-scheduling have high degree of individual authority & responsibility, few rules & decentralised. As they have unpredictable & complex tasks. • e-catalogue task activity tends to be performance driven with high rules. It is also centralised with simple & predictable tasks.	Organic/Mechanistic Nature: • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.
4. Current Organisation of Activities/Actors	
The work is coordinated between activities and employees by:	Coordination modes used are: • For the office as a whole are planning, goal

Industrial Audience	Academic Audience
• Planning, goal selection, decomposing tasks, manager's decision, prioritising of orders, unscheduled team meeting, standardisations & standardising norms values such as Rolls Royce ethics. • For e-sourcing, e-collaboration, e-scheduling by using schedules, mutual adjustment and interdepartmental teams. • For e-catalogue by using rules & schedules.	selection, task decomposition, managerial decision, priority order, unscheduled team meeting, standardisation and standardisation of norms. • For the e-sourcing, e-collaboration, e-scheduling are schedules, mutual adjustment and interdepartmental teams. • For the e-catalogue are rules and schedules.
The layout of the office is open without any physical constraints.	Constraints of Office Layout: Open layout without any physical constraints.
There is a flat hierarchy in the office, one manager that is in charge of five employees.	Structure: Flat structure.
The task activities are classified in terms of two characteristics: • e-sourcing, e-collaboration & e-scheduling have high degree of individual authority & responsibility, few rules & decentralised. As they have unpredictable & complex tasks. • e-catalogue task activity tends to be performance driven with high rules. It is also centralised with simple & predictable tasks.	Organic/Mechanistic nature: • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.
5. Current Planning of Work Units	
The method used to exchange information between employees required for the completion of their contribution to the team task is described for each task activity as: • e-sourcing, e-collaboration and e-scheduling are team work dependent such as R&D offices. • e-catalogue is sequentially dependent such as an assembly line.	Thompson's Interdependence: • e-sourcing, e-collaboration and e-scheduling are team. • e-catalogue is sequential.
The current state value stream maps are shown in Figures (7, 8, 9, 10 & 11) for each task activity.	Value Stream Mapping tool: The current state value stream maps are shown in Figures (7, 8, 9, 10 & 11) for each task activity.
6. Current Assessment of Individuals	
The methods used to monitor and evaluate the performance of the office & its employees are: • The manager of the office assesses the behaviour of the employees in terms of RR 13 leadership behaviours. • The manager infrequently assesses the employees in terms of their output to get them to focus on their plan & future. • The senior director monthly assesses the team in terms of their output to get them to focus on their plan & future. • Customer feedback (e.g. surveys) is used to assess the output of the employees. • The manager assesses the level of skills & training required by each employee, & sets a training plan to each employee that is linked to his objectives.	Management Control Systems: • Behavioural Controls by manager's direct observation in term of RR 13 Leadership behaviours. • Output Controls – Prospect Controls by having monthly meetings with the manager. • Output Controls – Prospect controls by having monthly team meeting with a senior director. • Output Controls – Customer feedback (e.g. surveys) • Personal controls in the form of a training plan done by them and the manager by linking the plan to their objectives.

Industrial Audience	Academic Audience
Employees are yearly assessed & rewarded in term of his/her behaviour & output. Output is assessed in terms of achievements of their numerical targets, which were set at the beginning of the year.	Reward System: • Subjective yearly reward system that is based on numerical target set at the beginning of the year for each employee of the e-sourcing, e-scheduling and e-collaboration. Whereas, an objective reward system is used for the e-catalogue. • Employees are rewarded based on their behaviour too.
7. Current Organisational Culture Characteristics	
The organisational values of the culture of the office are Quality, version controlled, accurate, commitment, involvement of the customer & highly secured. However, they are not strongly shared between people because they're flexible with low resistance to change.	Shared Values: The organisational values of the culture of the office are quality, version controlled, accurate, commitment, involvement of the customer & highly secured. However, they are weak as there is a low resistance to change.
The culture of the office has: • Values that concentrate on internal organic focus & flexibility. • Tools such as teamwork, talent management, collaboration, inter-personal relationships or empowerment.	Competing Values Framework: Clan culture.

Table (P.2) illustrates the recommended future state of the seven management systems of the office represented in terms of industrial & academic perspectives.

Industrial Audience	Academic Audience
1. Recommended Leadership Style	
The manager leads the employees by: • Giving the employees low amount of guidance or direction in terms of telling them what to do, when to do and how to do it, as well as a low amount of social backup and support as they need little encouragement.	The situational leadership styles recommended is: • S4 Delegating leadership style to lead employees who are classified to have high follower readiness level (R4).
2. Recommended Technology Characteristics	
It is recommended to use the same technology systems listed in the current state. The production method used to process: • e-sourcing, e-collaboration & e-scheduling is accomplished using a variety of techniques, skills & resources, but the choice, combination & order of application are decided by feedback from the object itself. • e-catalogue is linear and involves a series of activities or programmed tasks that are arranged sequentially and carried out in a pre-determined order.	Thompson's Technology Type: • Intensive type for the e-sourcing, e-collaboration & e-scheduling. • Long-Linked for the e-catalogue.
3. Recommended Employee Support	
The products & services of the office are variable. This requires extra support to be given to the employees in future state.	Heterogeneity: The products & services of the products of the office are heterogeneous. This requires extra support to be given to the

Industrial Audience	Academic Audience
	employees in future state.
The task activities are classified in terms of two characteristics: • e-sourcing, e-scheduling and e-collaboration may not have an objective rewards system & employees have high skill set & high discretion as it is unpredictable. This requires extra support to be given to the employees in future state. • e-catalogue may have an objective reward system, and employees have low skill set and low discretion as it is predictable. This does not require extra support to be given to the employees in future state.	Weak/Strong Situations: • e-sourcing, e-scheduling and e-collaboration are weak task activities. This requires extra support to be given to the employees in future state. • e-catalogue is a strong task activity. This does not require extra support to be given to the employees in future state.
e-sourcing, e-scheduling and e-collaboration task activities are complex. This requires extra support to be given to the employees in future state.	Task Complexity: e-sourcing, e-scheduling & e-collaboration task activities are complex. This requires extra support to be given to the employees in future state.
The task activities are classified in terms of two characteristics: • e-sourcing, e-collaboration & e-scheduling have high degree of individual authority & responsibility, few rules & decentralised. As they have unpredictable & complex tasks. This requires extra support to be given to the employees in future state. • e-catalogue task activity tends to be performance driven with high rules. It is also centralised with simple & predictable tasks. This does not require extra support to be given to the employees in future state.	Organic/Mechanistic Nature: • e-sourcing, e-collaboration & e-scheduling task activities are organic. This requires extra support to be given to the employees in future state. • e-catalogue task activity is mechanistic. This does not require extra support to be given to the employees in future state.
4. Recommended Organisation of Activities/Actors	
The work is coordinated between activities and employees by: • Planning, goal selection, notifying employees, decomposing tasks, manager's decision, prioritising of orders, unscheduled team meeting, standardisation & standardising norms values such as Rolls Royce ethics, participatory design to ask end individual users (i.e. customers). • For e-sourcing, e-collaboration, e-scheduling by using face to face discussion, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and/or interdepartmental teams. • For e-catalogue by using committees, planning, scheduled meetings, rules and/or schedules.	Coordination modes used are: • For the e-sourcing, e-collaboration, e-scheduling are face to face discussion, unscheduled meetings, standardisation, rules, schedules, mutual adjustments and/or interdepartmental teams, because they have team interdependence. • For the e-catalogue are committees, planning, scheduled meetings, rules and/or schedules, because it is sequentially interdependent. • "First come/first serve", priority order, budgets and/or managerial decisions, because sharing dependency exists. • Notification, because flow prerequisite dependency exists. • Standardisation and/or participatory design to ask individual users, because usability dependency exists. • Goal selection and/or task decomposition, because, fit dependency exists.
The layout of the office tends to be kept as open.	Constraints of Office Layout: Open layout.

Industrial Audience	Academic Audience
Flat hierarchy, where one manager.	Structure: Flat structure.
The task activities are classified in terms of two characteristics: • e-sourcing, e-collaboration & e-scheduling have high degree of individual authority & responsibility, few rules & decentralised. As they have unpredictable & complex tasks. • e-catalogue task activity tends to be performance driven with high rules. It is also centralised with simple & predictable tasks.	Organic/Mechanistic nature: • e-sourcing, e-collaboration & e-scheduling task activities are organic. • e-catalogue task activity is mechanistic.
5. Recommended Planning of Work Units	
The method used to exchange information between employees required for the completion of their contribution to the team task is described for each task activity as: • e-sourcing, e-collaboration and e-scheduling are team work dependent such as R&D offices. • e-catalogue is sequentially dependent such as an assembly line.	Thompson's Interdependence: • e-sourcing, e-collaboration and e-scheduling are team. • e-catalogue is sequential.
It is recommended to create future state value stream maps.	Value Stream Mapping tool: It is recommended to create future state value stream maps.
6. Recommended Assessment of Individuals	
The methods recommended to monitor and evaluate the performance of the office in general are: • To keep the manager of the office to assess the behaviour of the employees in terms of RR 13 leadership behaviours. The methods recommended to monitor and evaluate the performance of the e-sourcing, e-catalogue and scheduling are: • To keep the manager to infrequently assess the employees in terms of their output to get them to focus on their plan & future. • To keep the senior director to monthly assesses the team in terms of their output to get them to focus on their plan & future. • To keep in using customer feedback (e.g. surveys) to assess the output of the employees. • To keep the manager to assess the level of skills & training required by each employee, & allow the manager to set a training plan to each employee that is linked to his objectives. • To have sophisticated integrative mechanisms in the form of team meetings to increase the office's response, flexibility & adaptation. • To have performance appraisals that offer broad scope information, flexible aggregations & interactive information as	Management Control Systems for the office in general: • Keep behavioural Controls used manager's direct observation in term of RR 13 Leadership behaviours. Management Control Systems for the e-sourcing, e-scheduling and e-collaboration are: • Keep Output Controls – Prospect Controls by having monthly meetings with the manager. • Keep Output Controls – Prospect controls by having monthly team meeting with a senior director. • Keep Output Controls – Customer feedback (e.g. surveys). • Keep personal controls in the form of a training plan done by them and the manager by linking the plan to their objectives. • To have sophisticated integrative mechanisms in the form of team meetings to increase the office's response, flexibility & adaptation. • To have performance appraisals that offer broad scope information, flexible aggregations & interactive information as well as information given in a timely way. Management Control Systems for the e-catalogue are:

Industrial Audience	Academic Audience
well as information given in a timely way. The methods recommended to monitor and evaluate the performance of the e-sourcing, e-catalogue and scheduling are: • Operating procedures budgets and statistical reports. • Output and results controls. • Behaviour controls including standardisation, formalisation and rules. • Diagnostic controls by using control to offer feedback on operations.	• Operating procedures budgets and statistical reports. • Output and results controls. • Behaviour controls including standardisation, formalisation and rules. • Diagnostic controls by using control to offer feedback on operations.
It is recommended to use the following reward system: • For the e-sourcing, e-scheduling and e-collaboration, personnel rewards such as flexible 'cafeteria' benefits, lateral & upward promotions, equal opportunities, company's score card, training, group rewards, socialisation, training & skills based monetary pay. • For the e-catalogue, diagnostic controls (e.g. use of control to offer feedback on operations), and training, group rewards, socialisation, training and monetary pay.	Reward System: • For the e-sourcing, e-scheduling and e-collaboration, personnel rewards such as flexible 'cafeteria' benefits, lateral & upward promotions, equal opportunities, company's score card, training, group rewards, socialisation, training & skills based monetary pay. • For the e-catalogue, diagnostic controls (e.g. use of control to offer feedback on operations), and training, group rewards, socialisation, training and monetary pay.
7. Recommended Organisational Culture Characteristics	
To keep the organisational values of the culture of the office weakly shared between people because this will provide with flexibility and low resistance to change.	Shared Values: To keep the organisational values of the culture of the office with a weak strength, because the office is predominantly organic.
The culture of the office needs: • To keep its values to have an internal organic focus & flexibility. • To use tools such as teamwork, talent management, collaboration, inter-personal relationships or empowerment.	Competing Values Framework: To keep the culture as Clan.

Figure (P.3) shows the top up form of the final version of the conceptual model / methodology of implementation for office redesign.
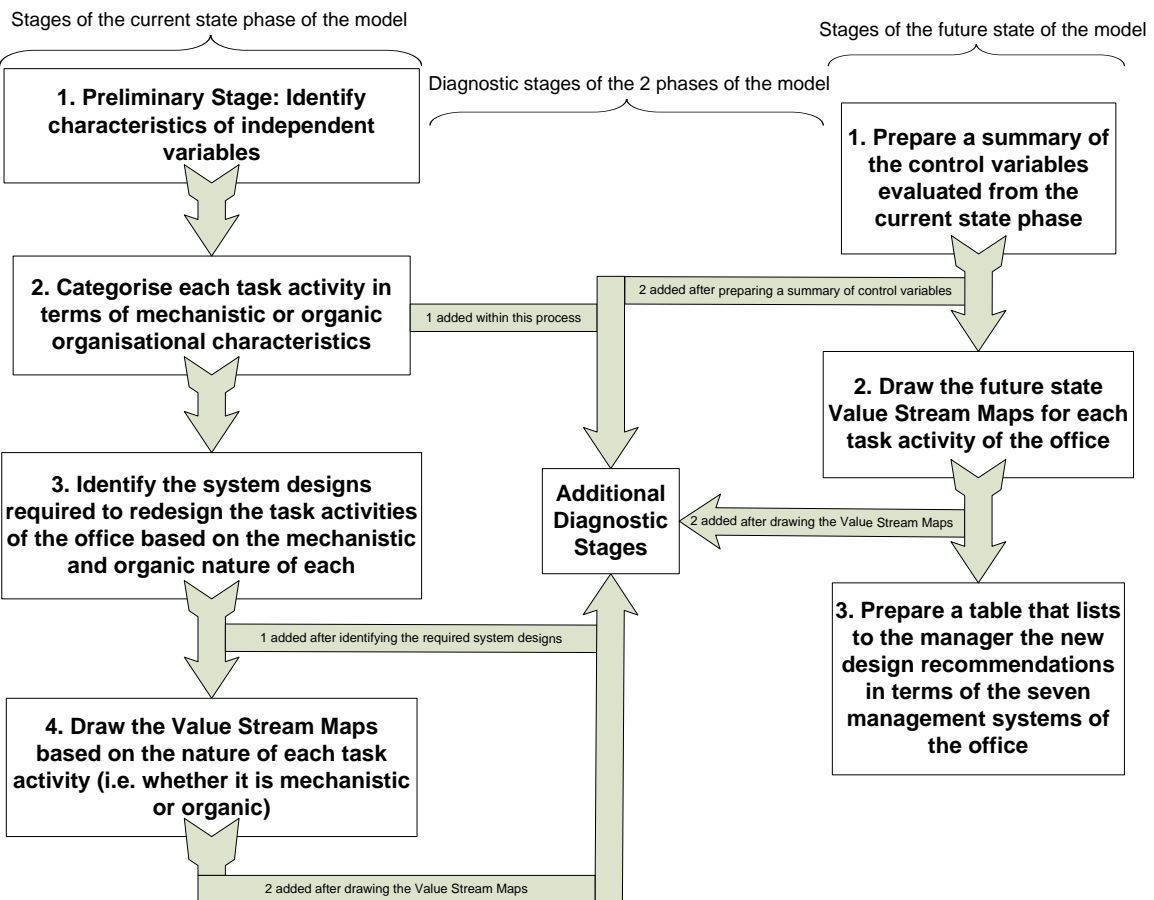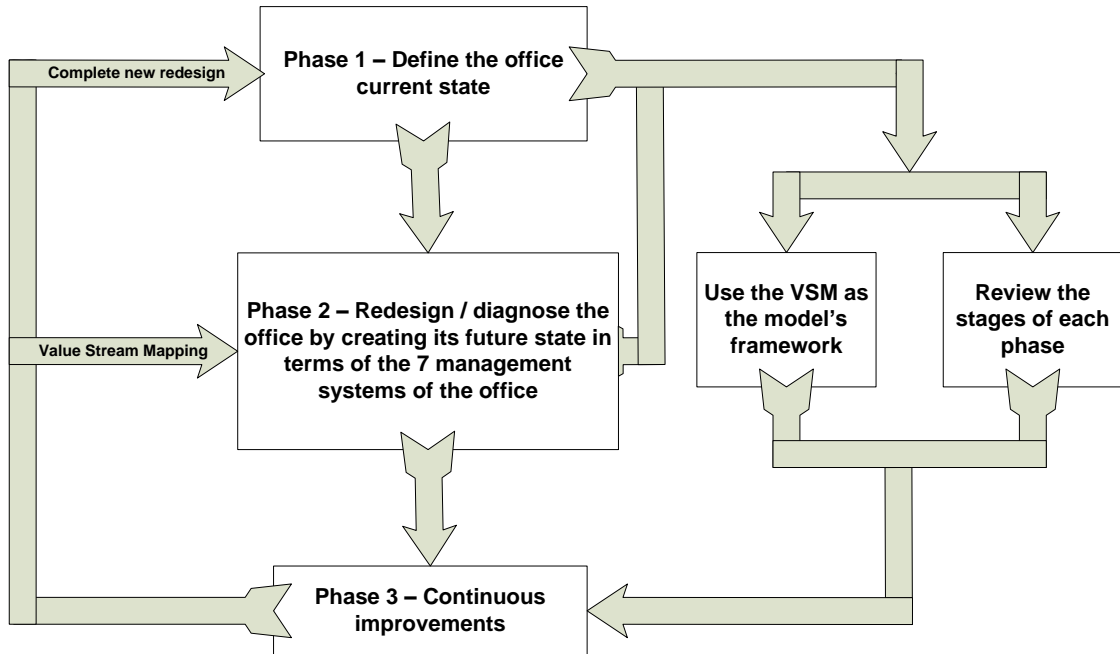
Figure (P.4) illustrates a mind map of seven management systems of the model used to redesign offices.
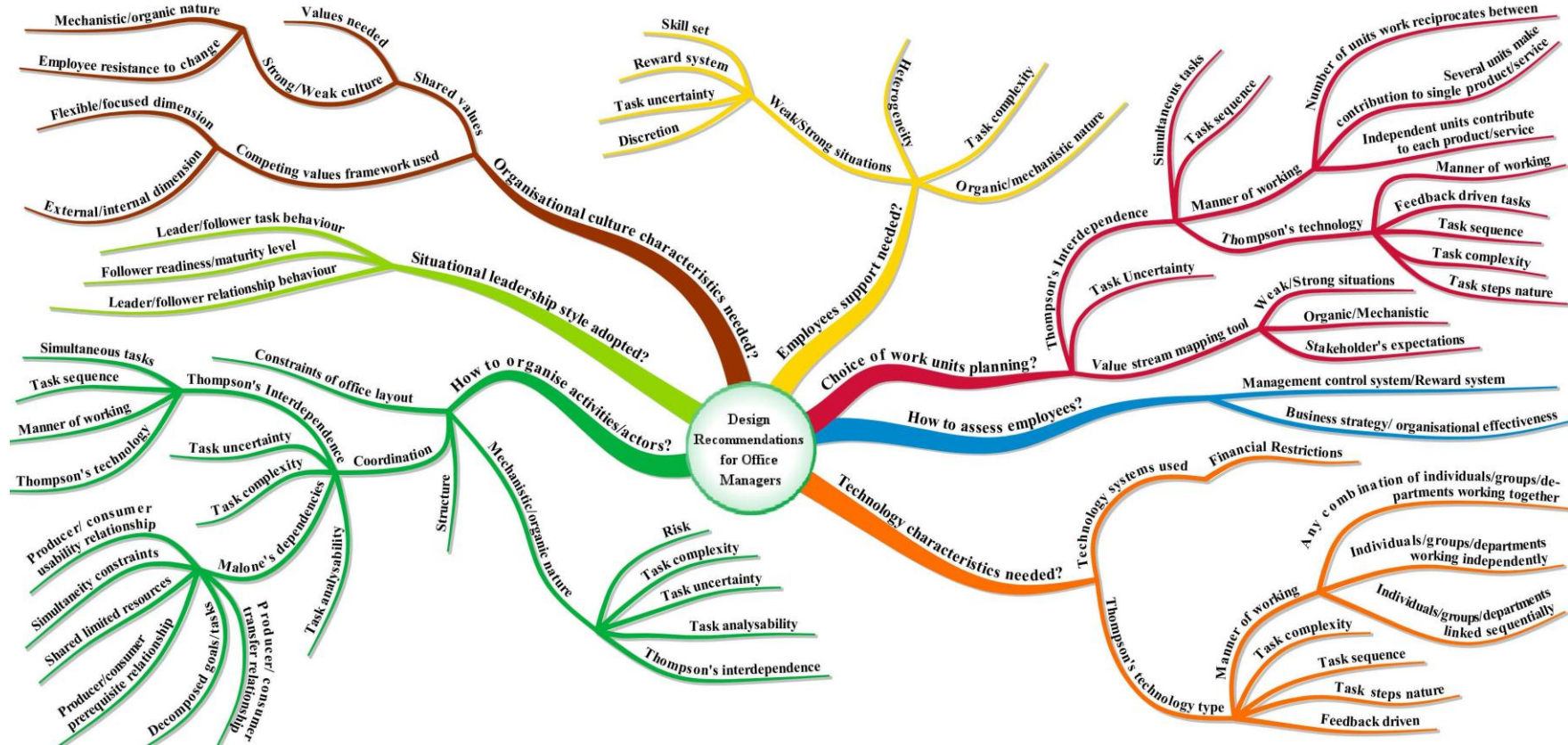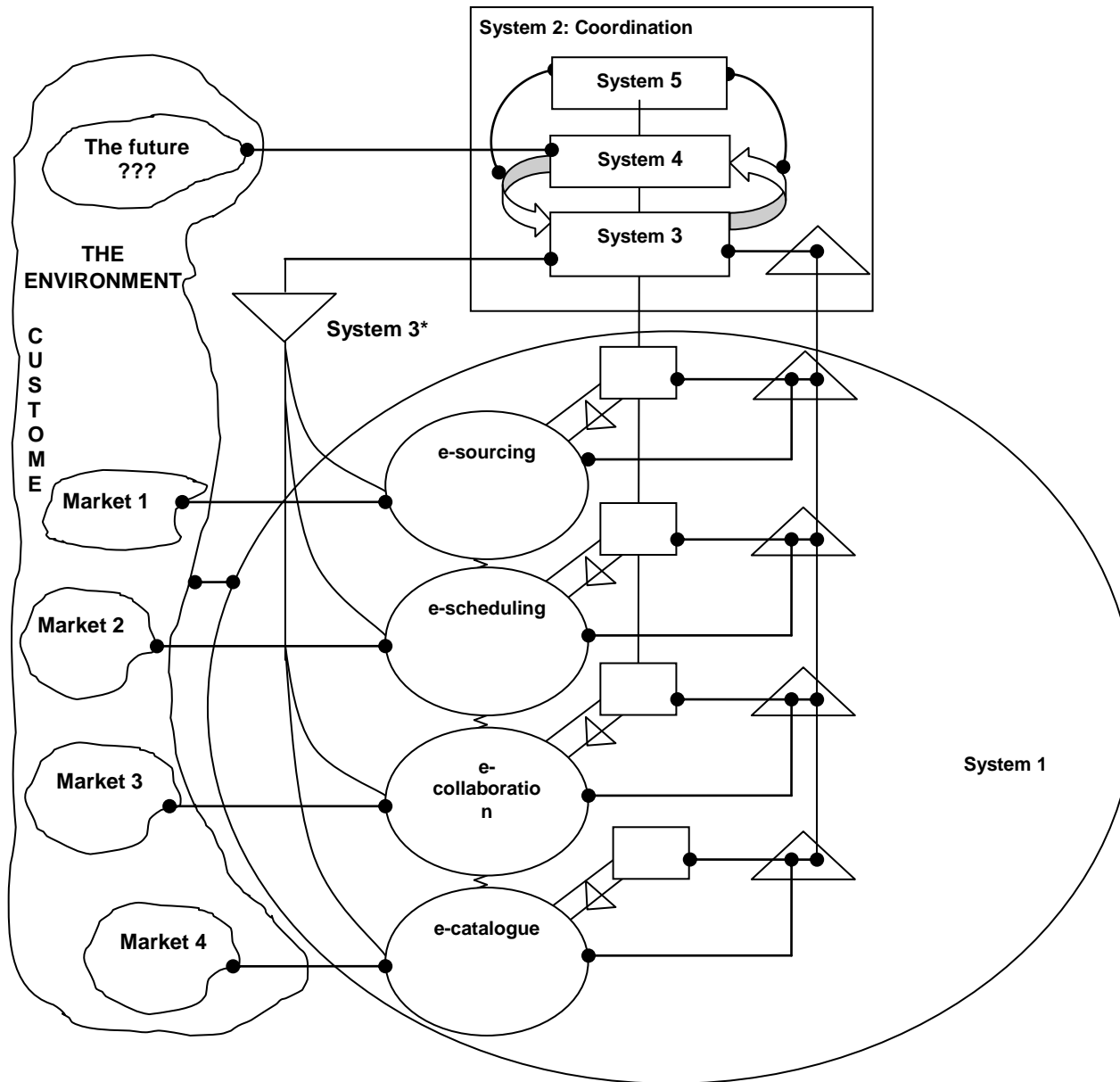
Figure (P.5) illustrates the current and future states of the office in terms of the Viable System Model.

The following table shows a comparison between the current and future states of each system of the VSM:

System 5 – Current State	System 5 –Future State
Policy and strategy which is set by Plc board of directors level	Same

System 4 – Current State	System 4 –Future State
Customer feedback, the mentor who makes recommendations, any member of the team about new technology.	Same

System 3 – Current State	System 3 –Future State
Planning system which consists of business plan deployment & plans for each employee around it. It is carried out by employees, manager and a senior. In addition, the manager plays a role in controlling people.	Same

System 3* – Current State	System 3* –Future State
Monthly individual behavioural controls in the form of Rolls Royce 13 Leadership Behaviours carried out by the manager	Same
Team output control (e.g. prospects controls) to focus on future plans. Having infrequent and general reporting carried out by a senior director	Same
Individual output control (i.e. Prospects controls) to focus on the plans, and the future. Also infrequent & general reporting by the manager	Same
The manager assesses the level of skills required by each employee, & sets a training plan to each employee that is linked to his objectives.	Same
Customer feedback (e.g. surveys) to assess the output of the employees	Product development information appraisals to monitor the levels of details, customer related information and customer feedback (e.g. surveys), time related issues, resources inputs and cost
	To have sophisticated integrative mechanisms in the form of team meetings to increase the office's response, flexibility & adaptation.
	Performance appraisals that offer broad scope information, flexible aggregations & interactive information as well as information given in a timely way

System 2 – Current State	System 2 –Future State
All task activities are coordinated using planning, goal selection, task decomposition, managerial decision, priority order, unscheduled team meetings, interdepartmental teams and standardisation of norms	Same
e-sourcing, e-collaboration and e-scheduling are coordinated using coordination modes such as schedules, mutual adjustments and interdepartmental teams. In addition, e-catalogue is coordinated using coordination modes such as standardisation, rules and schedules	Face to face discussion, unscheduled meetings, standardisation, rules, schedules, mutual adjustments, teamwork to coordinate team interdependent e-sourcing, e-collaboration and e-scheduling. Coordination modes such as committees, planning, scheduled meetings, standardisation, rules and schedules to coordinate sequentially interdependent e-catalogue.
	Coordination modes such as "first come, first sever", priority order, budgets and/or managerial decisions to manage sharing dependency
	Notification coordination mode to manage flow prerequisite dependency
	Coordination modes such as standardisation and participatory design by asking individual users to manage usability dependency

System 1 – Current State				System 1 –Future State			
System one consists of three task activities, for more details see value stream map of each task activity				System one consists of three task activities, for more details see value stream map of each task activity			
e-sourcing	e-scheduling	e-collaboration	e-catalogue	e-sourcing	e-scheduling	e-collaboration	e-catalogue
Team interdependent	Team interdependent	Team interdependent	Sequential interdependent	Team interdependent	Team interdependent	Team interdependent	Sequential interdependent
Intensive Technology	Intensive Technology	Intensive Technology	Long-Linked Technology	Intensive Technology	Intensive Technology	Intensive Technology	Long-Linked Technology
High skill set	High skill set	High skill set	Low skill set	High skill set	High skill set	High skill set	Low skill set
High Discretion	High Discretion	High Discretion	Low Discretion	High Discretion	High Discretion	High Discretion	Low Discretion
Weak	Weak	Weak	Strong	Weak	Weak	Weak	Strong
Yearly main assessment for measuring the output and the behaviour of the employees in all task activities. Employees will be rewarded based on their performance in both areas				e-sourcing, e-collaboration & e-scheduling can have personnel rewards such as flexible 'cafeteria' benefits, lateral & upward promotions, equal opportunities, company's score cards, training, group rewards, socialisation, training and skilful employee of the month reward, & skills based monetary pay. E-catalogue can have diagnostic controls (e.g. use of control to offer feedback on operations), & training, group rewards, socialisation, training, skills based monetary pay.			
Clan Culture with weakly shared values				Clan Culture with weakly shared values			
Situational leadership – S3 Participating Leadership style				Situational leadership – S4 Delegating leadership style to lead R4 followers.			

Figure (P.6) shows the current state value stream map of the e-sourcing (Request for quotations RFQ process) task activity.
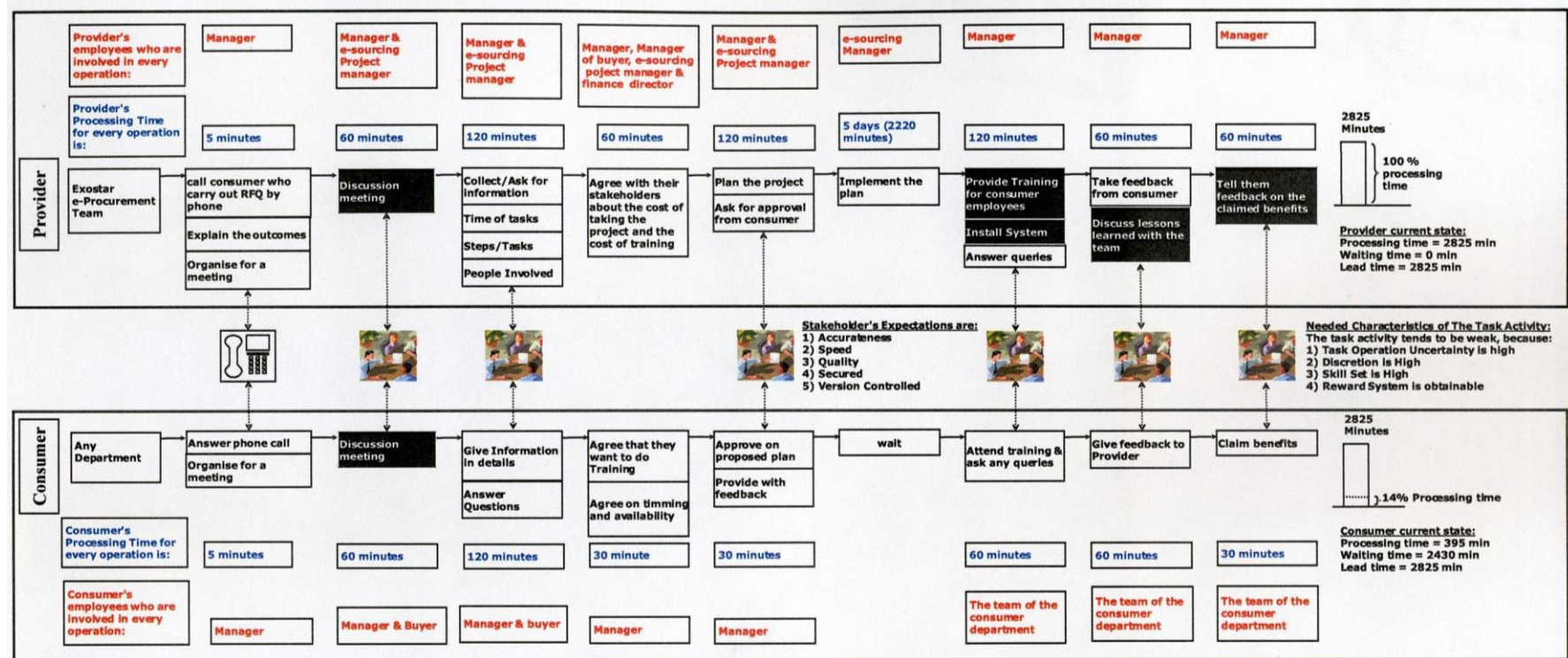
Figure (P.7) shows the current state value stream map of the e-collaboration (i.e. creating online meetings process) task activity.
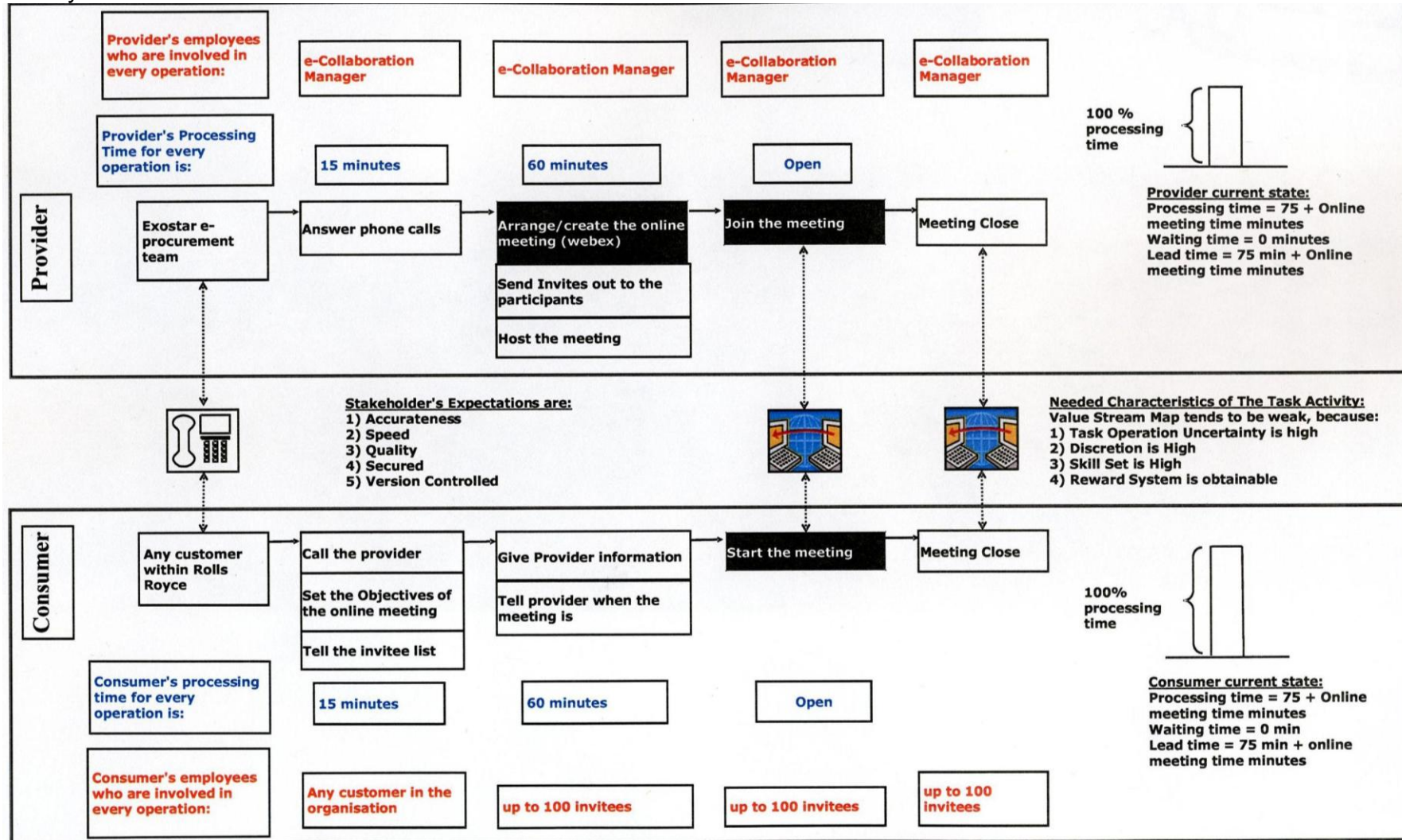
Figure (P.8) illustrates the current state value stream map of the e-scheduling (i.e. sending out schedules) task activity.
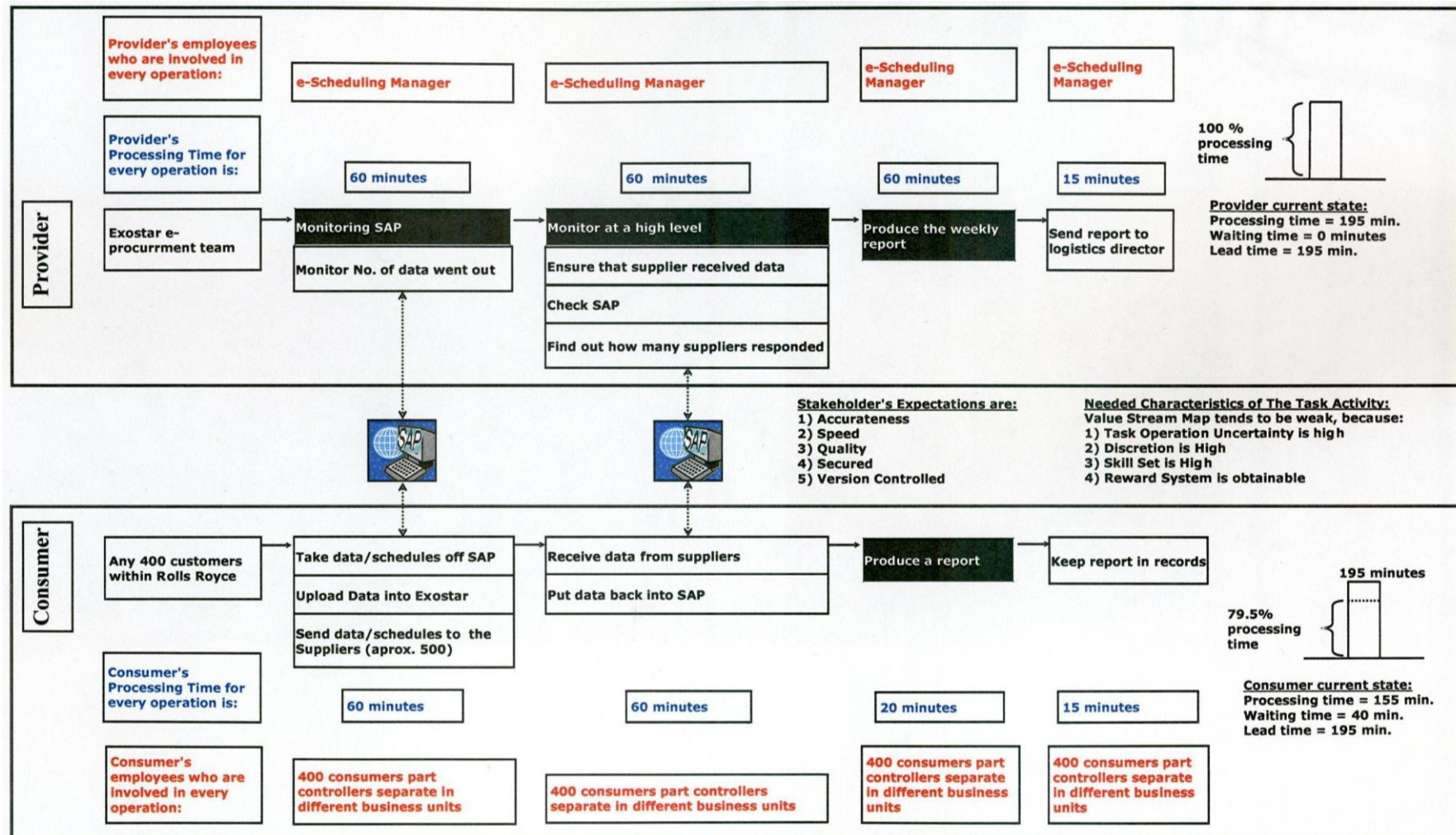
Figure (P.9) illustrates the current state value stream map of the e-catalogue (i.e. online ordering) task activity.

E- Catalogue – Online Ordering

Replenish Stock Order by any secretary within RR

Take the order	**Send order out to suppliers**	**Stock Arrival**	**Goods Receipt Officer Delivers Stock**
1X2	1X2	1X2	1X2

E-Catalogue Manager	E-Catalogue Manager & Suppliers	E-Catalogue Manager & Suppliers	Goods Receipt Officer
Phone	SAP	SAP	SAP

10 minutes   0 minutes   15 minutes   480 minutes   480 minutes   10 minutes   20 minutes

Lead time = 1015 minutes
Total Processing time = 525

Questions

Based on the information given in the front pages of the questionnaire, which details the current state of the office, the analysis carried out as well as a list of the redesign recommendation for the office's future state.

Kindly, could you answer the following questions:

Methodology of Implementation for Redesigning Offices Perspective

1. How **novel** is the methodology of implementation for redesigning the office?
   "I think It's really good because it looks at the whole system… holistic view… it is… yah… yes, it is novel, because they do not look at that… a total model like that in normal procedures."

2. Is it something you have already done before? If yes, please describe any parts of it that you have done before?
   "I have not done it… but I would say I have studied VSM before as I have studied it in my MBS… But I have not done the amount of work you have done in here breaking it down… To an extent yes I have done the VSM part but I not have broken them down into such model."

3. How **useful** is the overall methodology of implementation?
   "Yes, of course yah… I thought it was really good how you broke it down"

4. How **easy** is the overall methodology of implementation?
   "The way you broke it down… you have done in chunks… so it's a lot better… and again you are looking at the whole view as well… so it's good… In traditional planning and design you do not even look at the whole thing… you see what I mean… you only do parts of it… it definitely works how you broke it down"

5. How **helpful** is the overall methodology of implementation to managers?
   "I think it is very helpful… because again traditionally, managers look at only parts of it… they probably look at identifying the tasks, they won't look at the whole thing, how you broke it down here… yah… because managers they will only look at part of it, whereas they will forget the rest of it in redesigning the whole office… I would say the benefits are you get a total picture with this tool."

6. To what extent does this tool offer **tangible benefits** (such as time and cost reduction) to the office?
   "Yes, of course, it definitely offers tangible benefits, because you are breaking down in chunks… By doing this analysis and you're breaking it down in chunks, you are planning aren't you? Then you get the right resource levels in terms of how many people you want to work this… then in terms of the feedback mechanisms and everything else, you can quantify… you can actually quantify how many people you need and how much time is gonna need to set this up"

7. What do you think are the **strengths** of the methodology of implementation for redesigning the office?
"Yah the key strengths like I said is the holistic view… it allows you to look at the big picture, so when you are budgeting for example for people, when you are trying win this idea over your seniors… everything is there… you know for a business case… because it makes sense, the big picture is there."

8. What do you think are the **weaknesses** of the methodology of implementation for redesigning the office?
"The only weakness is to try to sell this to an organisation; because everyone is so busy… running around… and then you got the managers themselves, who needs to adopt this… its training this up… training people to use it really… it's the mindset and culture change. So the key things are training, mindset and culture to adopt this way of thinking, and the time for them to set down and actually do the work. I think that you need an induction program on how to use this for managers, because you cannot just give it to them in a piece of paper… you need to give this to a manager and take them through why they should be doing it… and what benefits its gonna give them and then give them an example as well… like a guideline of how to use it. I think that a selling point for this tool is to explain that it can help the managers understand how to make the office and organisation lean and we are all under pressure to do that… time, efficiency, savings etc… You know the lean organisation… because we are under pressure… if we look around this room… you will see that's what it's all about… so that's what they are talking about process improvements… and this can break it down for you that way… So the main selling point is to look at your total processes and how you can improve them using this model"

Mind Map – Seven managements systems of the office Perspective

9. How **novel** are the main seven management systems of the office represented in the main spurs of the mind map?
"I do not think that they are novel on their own, because people have thought about these, but maybe not all seven… but this model here shows you everything in one go… it is what to consider basically and how they link up, so this is showing you the link as well... so the novelty is in showing the design of the office in terms of the combination of those seven systems."

10. How **useful** are the main seven management systems of the office represented in the main spurs of the mind map?
"Very useful the way you broke it down there… in the picture (i.e. mind map)."

11. How **easy** are the main seven management systems of the office represented in the main spurs of the mind map?
"The picture looks nice and easy to understand… but each one will require different levels of effort to break down... The terms are very easy to understand…"

12. How **helpful** are the main seven management systems of the office represented in the main spurs of the mind map to managers who wish to redesign their offices?
"Very useful… because when you are redesigning an office, if you follow this format you will be okay… The thing is when you redesign an office, it is where you start… you see what I mean… this is showing you how to break it down if possible and the factors underneath them"

13. What do you think are the **strengths** of the main seven management systems of the office represented in the main spurs of the mind map?
"The strengths are that you have got seven systems and each of the systems are actually broken down as well into detail, so you are not just looking at seven, you are looking at the details behind them as well so I think that is a key strength. I also think that the main strength is that these are the common issues that you have when you are redesigning an office any way."

14. What do you think are the **weaknesses** of the main seven management systems of the office represented in the main spurs of the mind map?
"The weaknesses when you first see the mind map of the seven systems you think oh my god, what is this! It's like a big map… like an octopus or something… what is this… you know… So I mean it is complex… however, I think this is good, because if you put in other ways like a table, it's worse… but this (i.e. mind map) is in a picture… is not it? So it is better… it's better for the eyes… something different… you see… We are all used to see them in a table format… but this again is a picture, which shows you the big picture… if you see what I mean… how it's all linked together… and that's the key thing here… while considering detail, because there is a lot of detail there… but it's all sort of the way you broke it down… it's good… I like it… I like the structure… its really good… the more you look at it, the easier it gets… So I think this is extremely helpful… that is why I would like a copy from you as well, because I want to use it now
The one thing that I can't see in there is risks for each one of these, so you can flush out what what you want to have… So for your new design you want this kind of culture characteristics… shared values like this… However, what are the risks against that not happening? So I do not see where you would look at risks. Because, every change has got risks isn't it… You wanna do something… redesign an office… however, there are certain risks you need to flush out… for example, what if the people object, what you gonna do about it! Yah… another one could be how we got financial help… how we gotta budget to do this redesign! It's gonna need money… is not it! ... These are the type of things… where do you capture that! There is others as well, which is how you gonna deal with difficult people, who do not wanna do this! What you gonna do about it, How will you reinforce the change, if people do not want to do it! For example, the way you do it you can use communication, you get them involved and we wanna do this… what do you guys think! Make it look like it came from them, even though you know what the answer is, so that they engage from there… Like I said there are risks… technology… you want certain types of technologies, but have you got the security approval to have that technology within Rolls Royce… you see where

I am going with this… there is a lot of things that you have to think about risks wise… you need a risk register against this or you can have one risk register against each one of them… yah you need key risks against each one and mitigation plan… what you gonna do… So if that's the risk… what's the probability it could happen… is it high, medium or low… in terms of what's the impact of that risk happening… is it high, medium or low… So what's your mitigation plan… what you gonna do to offset the high, medium or low… you have to do it for each one of them… you have to flush it out… set down… come on… if you gonna go to a war… right… you wanna attack a country… you know you can take them out… you need to flush out these other things that could happen… What are we gonna do about them if any happens… the consequences… it's the manager that needs to lead it… because say for example… you did all this and suddenly you spent all that money but you can't you have that technology in Rolls Royce… Because it is not security approved… that could take up to four to eight months to get approved, so if the key people have not got the technology, four to eight months what they gonna do! So you wasted all that money for nothing… that's what you I mean… you need to flush out all the risks."

Value Stream Mapping Perspective

15. How **novel** is the new generation of value stream mapping, which is used for mapping and redesigning organic task activities?
"I think we do value stream mapping anyway… Rolls Royce does… We do not do it in the same way! No…"
"It is novel because you broke down in terms of the people… you got the black boxes, the provider/consumer…"

16. Is it something you have already done before? If yes, please describe any parts of it that you have done before?
"Part of it but not the whole things like this… I have done VSM before but not in that format… I have only done it in the conventional format."

17. How **useful** is the new generation of value stream mapping, which is used for mapping and redesigning organic task activities?
"Yes it is very good, because it's broke the roles down, the time and the tasks."

18. How **easy** is the new generation of value stream mapping, which is used for mapping and redesigning organic task activities?
"Very easy"

19. How **helpful** is the new generation of value stream mapping, which is used for mapping and redesigning organic task activities to managers?
"Oh yah of course… it is… you can know where the most time is spent"

20. To what extent does this new generation of value stream mapping, which is used for mapping and redesigning organic task activities, offer **tangible benefits** (such as time and cost reduction) to the office?

*"Because you know where the most time is spent, if you can improve these…
look at different ways, you can save on costs can't you…"*

21. What do you think are the **strengths** of the new version of value stream
    mapping, which is used for mapping and redesigning organic task activities?
    *"Again the strength is the way you've separated the roles with timing and tasks in
    terms of those two (i.e. provider and consumer). It's also the big picture it gives
    you… the other strength is like you can see opportunity where you can improve
    even more later on… the concept of the black box is good too… and that you
    have colour coded it as well…"*

22. What do you think are the **weaknesses** of the new version of value stream
    mapping, which is used for mapping and redesigning organic task activities?
    "No actually, I think it's good"

Overall Perspective, Recommendation and General Comments
23. What do you consider the main benefits of the methodology of implementation?
    What do you particularly like about it?
    *"What I like about it is that it gives you a big picture to consider when you are
    redesigning an office basically, everything that you should be thinking about is
    there and it's a step by step approach… so you are breaking it down into
    chunks."*

24. How useful do you think the new design recommendations are?
    *"Very useful because when you normally redesigning an office, there is no
    guideline to tell you what to look at! But this is telling you how to do it."*

25. What improvements can be made to the methodology of implementation? Could
    you please provide details about anything you would like to change?
    *"Again like I said to you… Improvements is training, how do you put this in a
    training package to help managers understand how to do this… because you are
    assuming they are not gonna know what a VSM is and everything…etc… you
    need to show them what these things are…
    And the other thing is that you need to do risk assessment against each one (i.e.
    office management systems) as well, because the tool talks about how to do it
    and you should be doing it this way… prescriptive… but there is no way I can see
    where you have to capture the risks to look at consequences if things go wrong
    and they do go wrong
    You need to combine any duplication in any of the stages of the model… like
    stages 10 and 11... It is duplication that… so you can take stage 11 out…"*

26. The design recommendations of the office were carried out in terms of seven
    management systems of the office, do you think that any of these systems should
    be modified or excluded from the model?
    "I think that they all should be there"

27. What are the barriers to the use of the methodology of implementation to redesign offices?
"Again it's the culture in an organisation, because we got a hundred and one things to do…you know… and where do you get the time to do this… you see what I mean… even when trying to redesign an office… its time… that's the key barrier… time to just set down… quality thinking and applying this"

28. Is there any information related to redesigning the office missing and not present here? If yes, what are they?
"Well, I talked about the risks"

29. What do you think are the strengths of these redesign recommendations?
"Again, you broken it down into chunks, because if you are trying doing it from scratch, there is so much you gonna miss out, but here you've broken it down and done step by step… you know how to think it"

30. What do you think are the weaknesses of these redesign recommendations?
"I cannot think of the weaknesses, but again the risks needs to adopted somewhere, that's the only weakness"

31. The following variables, also shown in the mind map, have been excluded from the model during testing for various reasons. Do you agree that each one of those variables should be excluded from the model, because they have been either been covered within other variables and/or have little effect on the overall design of the office?

   • Task Uncertainty has been excluded from the planning work units spur:
      It is defined from information processing theory perspective as the difference between the amount of information need to carry out the task and the amount of information already possessed by the organisation.
   "Yah, it is repeated… it is duplication that… so you can take it out…"

32. Any further comments?
"It is nice to see something refreshing like this… Very different"

The end! Thank you for your time and kind help and support.

Appendix Q – Results of the model validation from an industrial perspective using the Rolls Royce case study

Table (Q.1) shows the usefulness of the methodology of implementation, its various

tools & management systems as stated by Rolls Royce's manager.

The manager described the usefulness of the methodology of implementation as:
"Yes, of course yah… I thought it was really good how you broke it down"
"I think it is very helpful… because again traditionally, managers look at only parts of it… they probably look at identifying the tasks, they won't look at the whole thing, how you broke it down here… yah… because managers they will only look at part of it, whereas they will forget the rest of it in redesigning the whole office… I would say the benefits are you get a total picture with this tool..."
"… It definitely works how you broke it down"
"What I like about it is that it gives you a big picture to consider when you are redesigning an office basically, everything that you should be thinking about is there and it's a step by step approach… so you are breaking it down into chunks."
"It definitely offers tangible benefits"
The manager described the usefulness of the main management systems of the office represented in the mind map as:
"Very useful the way you broke it down there… in the picture (i.e. mind map)."
"Very useful… because when you are redesigning an office, if you follow this format you will be okay… The thing is when you redesign an office, it is where you start… you see what I mean… this is showing you how to break it down if possible and the factors underneath them"
The manager described the usefulness of the new generation of value stream mapping as:
"Yes it is very good, because it's broke the roles down, the time and the tasks."
"Very easy"
"Because you know where the most time is spent, if you can improve these… look at different ways, you can save on costs can't you…"
The manager described the usefulness of the new design recommendation as:
"Very useful because when you normally redesigning an office, there is no guideline to tell you what to look at! But this is telling you how to do it."

Table (Q.2) shows the strengths of the methodology of implementation, its various

tools & management systems as stated by Rolls Royce's manager.

The manager described the strength of the methodology of implementation and its new design recommendations as:
"… You broken it down into chunks, because if you are trying doing it from scratch, there is so much you gonna miss out, but here you've broken it down and done step by step… you know how to think it"
"Yah the key strengths like I said is the holistic view… it allows you to look at the big picture, so when you are budgeting for example for people, when you are trying win this idea over your seniors… everything is there… you know for a business case… because it makes sense, the big picture is there."

The manager described the strengths of the main management systems of the office represented in the mind map as:
"The strengths are that you have got seven systems and each of the systems are actually broken down as well into detail, so you are not just looking at seven, you are looking at the details behind them as well so I think that is a key strength..."
"… I also think that the main strength is that these are the common issues that you have when you are redesigning an office any way."

The manager described the strengths of the new generation of value stream mapping as:
"Again the strength is the way you've separated the roles with timing and tasks in terms of those two (i.e. provider and consumer)…"
"…It's also the big picture it gives you…"
"…The other strength is like you can see opportunity where you can improve even more later on…"
"The concept of the black box is good too… and that you have colour coded it as well…"

Table (Q.3) shows the weaknesses of the methodology of implementation, its various tools & management systems as stated by Rolls Royce's manager.

The manager described the weaknesses of the methodology of implementation & its new design recommendations as:
"… Is to try to sell this to an organisation; because everyone is so busy… running around…"
"…You got the managers themselves, who needs to adopt this… its training this up… training people to use it really…"
"…It's the mindset and culture change. So the key things are training, mindset and culture to adopt this way of thinking, and the time for them to set down and actually do the work…"
"Again it's the culture in an organisation, because we got a hundred and one things to do…you know… and where do you get the time to do this… you see what I mean… even when trying to redesign an office… its time… that's the key barrier… time to just set down… quality thinking and applying this"

The manager described the weaknesses of the main management systems of the office represented in the mind map as:
"The one thing that I can't see in there is risks for each one of these, so you can flush out what what you want to have… So for your new design you want this kind of culture characteristics… shared values like this… However, what are the risks against that not happening? So I do not see where you would look at risks. Because, every change has got risks isn't it… You wanna do something… redesign an office… however, there are certain risks you need to flush out… for example, what if the people object, what you gonna do about it! Yah… another one could be how we got financial help… how we gotta budget to do this redesign! It's gonna need money… is not it!... how you gonna deal with difficult people, who do not wanna do this! What you gonna do about it, How will you reinforce the change…"

Table (Q.4) shows the recommendations for improving the methodology of implementation and its management systems drawn by Rolls Royce's manager.

The manager recommended changes to the methodology of implementation as:
"… You need an induction program on how to use this for managers, because you cannot just give it to them in a piece of paper… you need to give this to a manager and take them

through why they should be doing it… and what benefits its gonna give them and then give them an example as well… like a guideline of how to use it."
"I think that a selling point for this tool is to explain that it can help the managers understand how to make the office and organisation lean and we are all under pressure to do that… time, efficiency, savings etc… You know the lean organisation… So the main selling point is to look at your total processes and how you can improve them using this model"
The manager was asked if any of the main management systems of the office represented in the mind map need to be modified or excluded, he answered as follows:
"… there is a lot of things that you have to think about risks wise… you need a risk register against this or you can have one risk register against each one of them… yah you need key risks against each one and mitigation plan… what you gonna do… So if that's the risk… what's the probability it could happen… is it high, medium or low… in terms of what's the impact of that risk happening… is it high, medium or low… So what's your mitigation plan… what you gonna do to offset the high, medium or low… you have to do it for each one of them… you have to flush it out…because say for example… you did all this and suddenly you spent all that money but you can't you have that technology in Rolls Royce… Because it is not security approved… that could take up to four to eight months to get approved, so if the key people have not got the technology, four to eight months what they gonna do! So you wasted all that money for nothing… that's what you I mean… you need to flush out all the risks."
The manager made recommendations to handle various risk types: *"…if people do not want to do it! For example, the way you do it you can use communication, you get them involved and we wanna do this… what do you guys think! Make it look like it came from them, even though you know what the answer is, so that they engage from there… Like I said there are risks… technology… you want certain types of technologies, but have you got the security approval to have that technology within Rolls Royce… you see where I am going with this…"*

Appendix R – Abbreviations and Glossary of Terms

1. **Business Strategy:** It refers to the part of the corporate strategy related to one of the firm's divisions or business units; hence a business strategy is formed for all business units that make up the company (Huczynski, Buchanan 2007).
2. **Centralisation:** It is the extent to which the right to make decisions and evaluate activities is concentrated, in particular when decision making is kept with the hands of a relatively small number of people at top level of the hierarchical level (McKenna 2006, Wang 2001, Daft 2001, Fredrickson 1986, King, Sabherwal 1992).
3. **Competing Values Framework:** It is a robust model used to understand a wide of variety of organisational and individual phenomena including theories of organisational effectiveness, leadership competences and roles, organisational culture, financial strategy, organisational design, information processing, organisational quality (Cameron 2009). It classifies organisational culture in terms of four different frameworks, Clan, Market, Adhocracy and Hierarchy (Cameron 2009).
4. **Coordination:** It is the management of dependencies between activities, for instance a coordination mechanism is a tool or method used to manage a dependency (Malone, Crowston et al. 1999, Malone, Crowston 1994, Nunez, Giachetti et al. 2009).
5. **Creativity:** It is the application of imaginative thought, which leads to an innovative solution to many problems as well as new ways of seeing things (Mullins 2007, Goodman 1995).
6. **Customer Demand Uncertainty:** It is the unpredictability in frequency of the customer demand.
7. **Discretion:** It is the individual differences in any person's variables, which determines behaviour in a given ambiguously structured situation (Mischel 1977).
8. **Decentralisation:** It is the opposite of centralisation (McKenna 2006) and it is to locate authority in lowest level possible without losing control (i.e. decisions are delegated to lower organisational levels delegate for example delegate routine matters and Centralise significant decisions) (Robey, Sales 1994, Daft 2001).
9. **Decision Support Systems:** These are systems that offer information to supplement managerial decision making rather than it (McKenna 2006).
10. Differentiation: It is the extent to which the work of individuals and the tasks, groups and units are divided up in an organisation (Huczynski, Buchanan 2007).
11. **Dynamism:** It is a measure of how the rate of change in external factors relevant to the organisation such as fluctuations in customer needs specification as well as market needs (i.e. actions of customers and competitors) change (McKenna 2006, Miller, Friesen 1984, Kreiser, Marino 2002, Huczynski, Buchanan 2007), in more general terms, it refers to the rate of change existing in an environment (Thompson 1967, Kreiser, Marino 2002, Huczynski, Buchanan 2007).
12. **Environmental Uncertainty:** It has a profound effect on organisation's structure (McKenna 2006) and it consists of both input environmental uncertainty and output environmental uncertainty.

13. **Financial Restrictions:** It is defined in this study as any limitations or constraints that are imposed on the financial resources of the office.
14. **Fit Dependency (Managing Tasks / Subtasks):** It exists when many activities collectively produce a single resource (Malone, Crowston et al. 1999). It occurs when an individual or group decides to follow a goal and then decomposes this goal into activities (or sub-goals), which together will accomplish the original goal (Malone, Crowston et al. 1999, Malone, Crowston 1994).
15. **Flow Accessibility Dependency:** It is a type of flow dependency, which exists when one activity produces something that is used by another activity, the thing produced must be transferred from the "producer" activity to the "consumer" activity (Malone, Crowston et al. 1999, Malone, Crowston 1994).
16. **Flow Dependency:** It is when one activity produces something that is used by another activity. This consumer / producer relationship is an extremely common kind of relationship between activities. It often leads to various types of dependencies such as perquisite, accessibility and usability (Malone, Crowston et al. 1999, Malone, Crowston 1994).
17. **Flow Perquisite Dependency:** It is a very common type of flow dependency, which exists between a "producer" activity and a "consumer" activity. It occurs when the producer activity must be completed before the consumer activity can begin (Malone, Crowston et al. 1999, Malone, Crowston 1994).
18. **Flow Usability Dependency:** It is a type of flow dependency, which exists when there is a producer/consumer relationship to ensure that whatever is produced should be usable by the activity that receives it (Malone, Crowston et al. 1999, Malone, Crowston 1994).
19. **Flow Usability in a Manufacturability Context Dependency:** It is a type of flow dependency, which exists when there is a producer/consumer relationship in a manufacturing context to ensure that whatever is produced should be usable by the process that receives it (Malone, Crowston et al. 1999, Malone, Crowston 1994).
20. **Formalisation and Standardisation:** Formalisation is the extent to which rules, standards and procedures that prescribe behaviour & job descriptions are used in the organisation (McKenna 2006, Huczynski, Buchanan 2007, Wang 2001, Fredrickson 1986, King, Sabherwal 1992). Standardisation is the extent to which the method for carrying out each task is standardised using roles and procedures (McKenna 2006, Robey, Sales 1994).
21. **Formal or Informal Organisation:** This refers to the extent to which an organisational unit is structured (McKenna 2006). A formal organisation is defined as the planned coordination of the activities of a number of people for the attainment of some shared explicit goal through the division of labour and function, and through a hierarchy of responsibility and authority (McKenna 2006, Schein 1988).On the other hand, an informal organisation is when the formal organisation's members relate to each other and take part in activities not prescribed by the organisational blue print (McKenna 2006).
22. **Gender Mix:** It is a term formulated in this study to describe the different working practices experienced in the case of men and women as advocated by Mullins (2002).

23. **History of the Office:** It is related to the state of the organisation in terms of the availability of the required human resources and materials (e.g. labour, raw material supply, sources of capital, production facilities… etc) (Miller, Friesen 1984).

24. **Heterogeneity:** It is a measure of the number of elements that are different in nature in an environment, hence it is the opposite of homogeneous environment (Thompson 1967, Kreiser, Marino 2002).

25. **Hostility:** It is also described by variables such as 'munificence' (Dess, Beard 1984, Kreiser, Marino 2002) or 'illiberality' (Kreiser, Marino 2002, Child 1972). Hostility is a characteristic of environments of having precarious industry settings, harsh overwhelming business climates, intense competition and the relative lack of exploitable opportunities (Kreiser, Marino 2002, Covin, Slevin 1989).

26. **Job Satisfaction:** It is the attitude of the people in a work context, which is associated with how well the person's expectations at work are in line with outcomes (McKenna 2006).

27. **Input Environmental Uncertainty:** It refers to the lack of patterning between the elements of the environment of the organisation such as suppliers, regulatory agencies, labour market, clients and customer, competitors, scientific and technical communities ...etc (McKenna 2006, Robey, Sales 1994, Dill 1958).

28. **Integration:** It is the needed level to which units in an organisation are linked together as well as their respective degree of independence (Huczynski, Buchanan 2007).

29. **Interdependence:** It reflects the degree to which members have to exchange information and/or means for the completion of their contribution to the team task (Van Vijfeijken, Kleingeld et al. 2006), it is also the extent to which the work tasks carried out in an organisation by one team member or department affect the task performance and other teams members or departments (Thompson 1967, Huczynski, Buchanan 2007).

30. **Lean Office:** It is the process that incorporates key concepts of Japanese lean manufacturing production within the business office environment.

31. Leadership Style: It implies that leadership processes do not reside solely in the person and their personality traits; in fact it could be cultivated as distinctive patterns of behaviour (McKenna 2006).

32. **Management Control System:** It is also called control systems, performance management or management control systems (Mullins 2007, McKenna 2006, Chenhall 2003, Robey, Sales 1994). It is used to monitor and evaluate the performance of organisations as a means of developing human resources with productivity strongly in mind (Mullins 2007, McKenna 2006, Chenhall 2003, Robey, Sales 1994).

33. **Mechanistic Structure or System:** A mechanistic organisation requires relatively stable conditions and high predictability (Mullins 2007, McKenna 2006, Robey, Sales 1994, Burns, Stalker 1961, Huczynski, Buchanan 2007).

34. Office: It is a semi-autonomous accountable human group working together with some form of interdependence between them as an organisation both distinct from and a part of the company itself. Therefore, an office is possibly part of a larger department, which may be within an even larger organisation that has individuals who work towards a common goal.

35. **Constraints of Office Layout:** It is defined in this study as the variable that describes the general layout of the offices as well as any physical constraints that would impede other office design configurations. For instance, a modern layout is the open office which addresses extent barriers between departments, offices and individuals are used, as minimising these barriers in the modern office creates a situation whereby more frequent horizontal communication is facilitated (Tapping, Shuker 2003, McKenna 2006).

36. **Office (Re)Design:** It relates mainly to the design of the management systems of offices needed to allow the achievements of the goals of its individuals, while considering the physical aspects of the office related to increasing office effectiveness and leanness.

37. **Output Environmental Uncertainty:** It is the lack of patterning related to the output and it consists of Dynamism (McKenna 2006, Miller, Friesen 1984, Duncan 1972) and Customer Demand Uncertainty.

38. **Organic Structure or System:** It is more relevant to the conditions of change when the markets and the technology tend to become unstable and less predictable (McKenna 2006, Huczynski, Buchanan 2007).

39. **Organisational Culture:** It is a set of values that assists the organisation's individuals in understanding which actions are regarded acceptable and which are not (Moorhead, Griffin 2004).

40. **Organisational Effectiveness:** It has been defined by Zammuto as "human judgements about the desirability of the outcomes of organizational performance from the vantage point of the varied constituencies (stakeholders) directly and indirectly affected by the organization" (Robey, Sales 1994, Zammuto 1984). Therefore, it is not reflected in the accomplishment of a single stated goal (Zammuto 1984), it is rather related to organisational goals (Robey, Sales 1994).

41. **Organisational Strength:** It is a distinction between organisational cultures (McKenna 2006, Gordon, Di Tomaso 1992), in terms of the degree to which the values and assumptions that influence the behaviour of the employees are shared by the members of the corporate (McKenna 2006, Robey, Sales 1994, Schein 1985).

42. **Organisation Structure:** It is the formal allocation of work roles between members of the organisation, as well as the administrative mechanism to control, coordinate and integrate their work activities, so they are directed towards the objectives and goals of the organisation (Mullins 2007, Ghani, Jayabalan et al. 2002, Child 2005).

43. **Pressure:** It is defined in this study as the percentage of time the employees spend in processing their daily tasks compared to the overall time.

44. **Readiness Level (R):** It is also called the maturity level, and it is defined as the degree to which followers have the willingness and the ability to achieve a particular task and it is not related to personal attributes (Mullins 2007, Hersey, Blanchard et al. 2008).

45. **Reward System:** It is the human resource policy and practice, which is based on an open and participative appraisal with two-way feedback (Galbraith, Downey et al. 2002, Huczynski, Buchanan 2007).

46. **Risk:** It is concerned with situations in which probabilities can be attached to specific events occurring (Chenhall 2003), from this a working definition of risk

has been inferred as the consequences of committing a mistake in which probabilities can be attached to specific events occurring, they might be as simple as repeating the activity (i.e. low risk) or as serious as life threatening (i.e. high risk).

47. **Sharing Dependency (Shared Resources):** It is when two activities require the same (limited) resources (Malone, Crowston et al. 1999, Malone, Crowston 1994).

48. **Simultaneity Constraints Dependency:** It exists when activities need to occur at the same time (or cannot occur at the same time). It also exists whenever people schedule meetings (Malone, Crowston et al. 1999, Malone, Crowston 1994).

49. **Size:** It is the factor that truly influences structural organisational dimensions (Mullins 2007, McKenna 2006, Robey, Sales 1994, Huczynski, Buchanan 2007) such as specialisation (i.e. number of specialised roles and activities) , formalisation, standardisation of roles and procedures, mechanism for coordination, and centralisation (Mullins 2007, McKenna 2006). It is usually measured in terms of the number of employees (Mullins 2007, Robey, Sales 1994, Huczynski, Buchanan 2007).

50. **Skill Set:** It is also called 'people practices' (Galbraith, Downey et al. 2002), it represents the collective human resources practices, which enable and empower employees by creating organisational capabilities from the many individual abilities and skill sets existing in the organisation (Galbraith, Downey et al. 2002).

51. **Stakeholders' Expectations:** It refers to any group or individual who affects or is affected by the achievement of the objectives of the organisation (Simmons, Lovegrove 2005, Freeman 1984).

52. **Strong Culture:** It is a distinction between organisational cultures (McKenna 2006, Gordon, Di Tomaso 1992). A strong culture means that these values are strongly held, because there is a widespread agreement between members about what the organisation stands for (McKenna 2006, Robey, Sales 1994, Schein 1985).

53. **Strong Task or Situation:** It is a psychological situation (treatment, stimuli) that leads to individuals construing the particular events in the same way (Mischel 1977).

54. **Task Activity:** It has been defined in this study as a collection or a group of activities that are part of the value stream. In this sense, an office is regarded as a collection of task activities that are carried out by its individuals and are part of the value stream of the organisation.

55. **Task Analysability:** It has been defined as the degree to which standardised solutions are available to solve the problems that come up (Robey, Sales 1994, Huczynski, Buchanan 2007, Perrow 1971).

56. **Task Assignment Dependency:** It is a specialisation of the sharing dependency and it occurs when the time of people who can do the tasks is being shared (Malone, Crowston et al. 1999, Malone, Crowston 1994).

57. Task Complexity: It is as the property of being able to assume a large diversity of states or modes of behaviour in a task (Schwaninger 2009, Nicolis 1995).

58. **Task Operation Uncertainty:** It is the lack of patterning in the process and knowledge crucial to finish the task and it corresponds to the concept of Technology (Robey, Sales 1994, Perrow 1967).

59. **Task Uncertainty:** It is the individual's perceived inability to anticipate something in an accurate way (Milliken 1987).

60. **Technology:** It is the production process type incorporated by the organisation (Thompson 1967, Huczynski, Buchanan 2007, Perrow 1971, Woodward 1965), which involves the activities, equipment, systems and knowledge used to convert the inputs of the organisation into required outputs (Mullins 2007, Johns 1992).

61. **Trust:** It is a belief or an expectation that a person can rely on another person's words and actions (Dirks, Ferrin 2001).

62. **Value Stream:** It is a is a set of all specific actions required to bring a specific product or service through three critical managements tasks of any business, these tasks are problem solving (e.g. design), Information management (e.g. order processing and other non production activities) and physical transformation (e.g. converting raw materials to finished product) (Tapping, Shuker 2003, Keyte, Locher 2004, Keyte 2004, Rother, Shook et al. 1998).

63. **Value Stream Mapping:** It is a technique that has been successfully used to simulate shop floor processes with respect to sequence of operations and tasks as well as the number of labour and time associated with every operation (Womack, Jones 2005).

64. **Weak Culture:** It is a distinction between organisational cultures (McKenna 2006, Gordon, Di Tomaso 1992), in terms of the degree to which the values and assumptions that influence the behaviour of the employees are shared by the members of the corporate (McKenna 2006, Robey, Sales 1994, Schein 1985). A Weak Culture means that these values are weakly held between members of the organisation (McKenna 2006, Robey, Sales 1994, Schein 1985).

65. **Weak Task or Situation:** It is psychological situation (treatment, stimuli) that is not decoded uniformly by individuals (Mischel 1977).