

**An Empirical Investigation of the Linkage  
between Dependability, Quality and Customer  
Satisfaction in Information Intensive Service  
Firms**

**Submitted By  
Vikas Kumar**

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*Vikas Kumar*

## **ABSTRACT**

The Information service sector e.g. utilities, telecommunications and banking has grown rapidly in recent years and is a significant contributor to the Gross Domestic Product (GDP) of the world's leading economies. Though, the information service sector has grown significantly, there have been relatively few attempts by researchers to explore this sector. The lack of research in this sector has motivated my PhD research that aims to explore the pre-established relationships between dependability, quality and customer satisfaction (RQ1) within the context of information service sector. Literature looking at the interrelationship between the dependability and quality (RQ2a), and their further impact on customer satisfaction (RQ2b) is also limited. With the understanding that Business to Business (B2B) and Business to Customer (B2C) businesses are different, exploring these relationships in these two different types of information firms will further add to existing literature. This thesis also attempts to investigate the relative significance of dependability and quality in both B2B and B2C information service firms (RQ3a and RQ3b). To address these issues, this PhD research follows a theory testing approach and uses multiple case studies to address the research questions. In total five cases from different B2B and B2C information service firms are being investigated. To explore the causality, the time series data set of over 24 to 60 months time and the 'Path Analysis' method has been used. For the generalization of the findings, Cumulative Meta Analysis method has been applied.

The findings of this thesis indicate that dependability significantly affects customer satisfaction and an interrelationship exists between dependability and quality that further impacts customer satisfaction. The findings from B2C cases challenges the traditional priority afforded to relational aspect of quality by showing that dependability is the key driver of customer satisfaction. However, B2B cases findings shows that both dependability and quality are key drivers of customer satisfaction. Therefore, the findings of this thesis add considerably to literature in B2B and B2C information services context.

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# **Chapter 1**

## **Introduction**

## **1.0 Introduction**

Services have drawn considerable attention from academics and its practitioners over the last few decades, as a result of its unprecedented growth in most of the developed and developing economies. The growth in services has picked up steadily since the 1950s and now the world economy has evolved as mainly service-based (Lovelock and Wirtz, 2007). This has changed the way we look at operation management issues which were earlier predominantly seen and addressed from the manufacturing perspective. This is also evident from the contribution of services to the Gross Domestic Product (GDP) (Paulson, 2006; Lovelock and Wirtz, 2007) of most of the developed economies such as the U.S. (80%), UK (75%), Japan (74%), France (73%) and Germany (68%). Despite their growth, services have not received sufficient attention from researchers; manufacturing-oriented research has so far dominated. This compels researchers to emphasize on service-oriented research and fill the existing research gaps in this area.

In recent years the information service sector has emerged as a strong contributor to the GDP with the rapid advancement in modern internet and communication technologies across the world (Karmarkar and Apte, 2007; Apte et al., 2008). Realizing the growing significance of information services in the world wide economy and the lack of enough research evidence, this PhD thesis aims to address some of the service operation issues in the context of information service settings. There are two critical dimensions to service performance: performance relative to operational elements and performance relative to relational elements (Stank et al., 1999). However, service operations management views services from customer and operational perspectives (Sampson, 2001; Sampson et al. 2006). Literature on service quality tends to advocate relational aspects and puts less emphasis on the operational aspects. This thesis therefore attempts to fill this gap and highlights the importance of operational elements. This research also emphasizes that performing well on operational elements leads to satisfied customers. Operational indicators such as dependability, quality and speed have been of interest for operations management researchers (Stank et al. 1999; Slack et al., 2004, etc.). This research is primarily focused on two operational elements of the service performance; dependability and quality that have widely argued in service quality literature (Zeithaml et al., 1990; Parasuraman, 1991; Gonzalez et al., 2007). The thesis investigates their linkages with customer satisfaction in a new context of information intensive services.

This chapter introduces the topic and outlines objectives of my research. The organisation of the thesis is also highlighted in this chapter. The chapter begins by indicating both the context and the research rationale. The chapter then outlines the theoretical context in brief. Thereafter, the research objectives and the significance of this thesis are highlighted. The chapter concludes by outlining the organisation/structure of this thesis.

This chapter is organized as follows. Section 1.1 covers the context and research rationale of this thesis. A brief discussion of the theoretical context is presented in Section 1.2. The aims and objectives of the research are presented in Section 1.3. Section 1.4 highlights the significance of this research. Finally, the organisation of this thesis is presented in Section 1.5.

## **1.1 Context and Research Rationale**

Research by Apte and Nath (2007) points out that the contribution of the information sector in US Gross National Product (GNP), grew from about 46 percent in 1967 to about 63 percent in 1997. The rapid development in Information and Communication Technologies (ICT) in the last decade has revolutionised the ways of presenting and collecting information and knowledge (OECD 2000; OECD 2009) showing that slowly the world economy is moving towards an information-driven economy. A review of literature suggests however that the material-based service viewpoint still dominates research and very few researchers have actually explored the information service sector (Machlup, 1962; Porat and Rubin, 1977; Kramarkar and Apte, 2007; Apte et al., 2008; etc). The differences between these two views of the service economy have been highlighted in this research. The varying nature of the information services from those which are material-driven has challenged practitioners to find strategies more suitable in the information economy context. The lack of academic research fails to provide practitioners an insight to the information sector, inspiring me to investigate the service operations issues in this context for the purposes of this PhD.

The growth in the service sector has consequently led researchers to attempt to distinguish services from manufacturing. Several researchers have classified or defined services in different ways: Hill (1999) interprets services as intangible commodities,

Lovelock and Wirtz (2007) define them as economic activities offered by one party to another and Murdick et al. (1990) define services as economic activities that produce time, place, form or psychological utilities. Services are however usually interpreted as being intangible, heterogeneous, inseparable, and perishable. These are known as IHIP (Intangibility, heterogeneity, inseparability and perishability) characteristics (Edgett and Parkinson, 1993 and Zeithaml et al., 1985). The IHIP characteristics have however been criticized by several researchers (Lovelock and Gummesson, 2004; Gummesson, 2000; Vargo and Lusch, 2004a, b). These criticisms will be discussed in detail later in this thesis. Researchers also identify a number of types of services, such as professional services, outsourcing services, shopping services, standardized services, customized services, people-processing services, and information-processing services (Lovelock, 1983; Silvestro et al., 1992; Apte and Mason, 1995; Lovelock and Yip, 1996; Karmarkar, 2004). They are also primarily classified as material- and information-based services (Karmarkar and Apte, 2007).

Service operations management views services from customer and operational perspectives. The unified service theory (UST) states that ‘services are production processes in which each customer provides significant elements which are essential inputs for production’ (Sampson, 2001; Sampson et al. 2006). This is different from manufacturing or non-service processes where production can occur independently of customers. The customer involvement in the production process makes service operations issues highly complex. Service operation has generated much curiosity among researchers such as Rust and Oliver (1994), Voss and Johnston (1995), Heskett et al. (1997) and Roth et al. (1997b) who have been undertaking empirical work to understand the links between operations drivers and performance outcomes: for instance quality, staff satisfaction, and profit and customer satisfaction. Johnston (1999, 2005) highlights the lack of research addressing the service operations issues while Chase and Apte (2007) further identify that managing operations in information intensive services and using behavioural science to improve the customer experience, are among the areas of high potential for research in service operations. This lack of research in the information sector has also been pointed out in the work of Apte and Nath (2007), Lovelock and Wirtz (2007) and Karmarkar and Apte (2007).

In summary, the literature suggests that there is a need for research in the information service sector. A review of the literature from the information service sector and service

operations management will identify the potential areas for research in the information service settings. The research questions and objectives will be pointed out subsequently at the end of the literature review chapters. The investigation of the service operations issues in an information economy context will add to the literature and to the theory development. The next section will develop the theoretical context of this thesis.

## **1.2 Theoretical Context**

The theoretical foundation of this research builds on the theories and understanding of the literature from the information service sector and service operations management. A review of the literature from both segments has been conducted here to identify the key research issues and the gaps in the research. Two chapters have been devoted to the literature review with the information service sector reviewed in Chapter 2 and service operations issues in Chapter 3 of this thesis. This section summarises the theoretical perspectives of this research and the relevant literature from information services and service operations management in order to identify those questions that address the objectives of this thesis.

### **1.2.1 Information Services Context**

The information services literature has been reviewed in order to explore the context of this PhD research. Recent developments in internet and communication technologies have revolutionized the way in which information is transferred and processed. This has led to the growth in the information service sector which is now a significant contributor to the GDP of many developing and developed nations (Apte and Nath, 2007; Lovelock and Wirtz, 2007; Karmarkar and Apte, 2007). The literature review differentiates information services from material-based services and argues that information services are distinct and cannot be dealt in the same way as the material-based services (Ambrosi et al., 2005; Lovelock and Wirtz, 2007; Karmarkar and Apte, 2007). Further it has been pointed out, however, that separating any services completely from material-based services is very challenging as many contain both components. This signifies the complexity of the services.

The main focus of this literature review is on highlighting the significance of information sector in the world economy and then further pointing on the need for research in this context. A comprehensive literature review points out that very few researchers have actually explored the information sector comparative with its development in recent years (Machlup, 1962; Porat, 1977; Porat and Rubin, 1977; Kramarkar and Apte, 2007; Apte et al., 2008; etc.). Hence, there is ample scope for exploration of the information sector and a need to address the service operations issues in an information services context. Literature review also distinguishes services from manufacturing. Different classification schemes of services have also been highlighted. Literature also indicates that information services can be further categorized as Business to Business (B2B) and Business to Customer (B2C) information services. The customer requirements in both the businesses (i.e. B2B and B2C) are different and this is discussed in detail.

### **1.2.2 Service Operations Management Perspective**

The service operations management area has attracted the attention of researchers in the last few decades because of the growing significance of services. Johnston and Clark (2001) define service operations management as ‘an activity that is concerned with both what service we deliver and how it is delivered to our customers’. Service operations management involves transformation of people, facilities and goods as input, which goes through service process or service experience and results in an end product. For example, to avail the haircut service, a person has to go himself through the process of haircutting, thus actively getting engaged in the production of the service outcome i.e. end product (haircut). Therefore, the judgement of the quality of service relies on the service experience and service outcome, and the success of the service process is judged by several operations performance indicators.

There are two critical dimensions to service performance: performance relative to operational elements and performance relative to relational elements (Stank et al., 1999). This PhD research focuses on the operational elements of the service performance. The operations performance indicators for manufacturing are well known, identifying quality, cost, flexibility, dependability, speed and productivity as some of the competitive capabilities (Vickery et al., 1997; Stank et al. 1999; Slack et al., 2004). The research names quality, dependability and speed of delivery as some of the

frequently used operations performance indicators in information processing firms (Moutinho and Brownlie, 1989; Schlesinger and Heskett, 1991; Bloemer et al., 1998; Stank et al., 1999; Avizienis et al., 2004; Rosenzweig and Roth, 2004; Bielen and Demoulin, 2007; Lai and Yang, 2009). Quality and dependability are key indicators that affect customer satisfaction and are well established in the relevant literature (Zeithaml et al., 1990; Parasuraman, 1991; Taylor and Baker, 1994; Gonzalez et al., 2007). Therefore, this research is particularly focused on investigating two operations performance indicators; quality and dependability.

The literature identifies dependability of service as a critical factor affecting customer satisfaction and loyalty. In this thesis dependability is measured as an ability of the service firm to provide services on time and as promised. Quality has been measured from a relational viewpoint, as a customer's perception of the service experience. This measurement of quality in this thesis is different from the SERVQUAL scale which measures quality across five dimensions. The information service firms studied in this thesis did not employ the SERVQUAL scale while measuring quality. Nonetheless, some questions that were used by the firms to evaluate quality closely resemble to some of the SERVQUAL dimensions. Thus, the data collected has independent measures on the quality and dependability of the services provided to customers. Speed of delivery was measured as the average lead time to deliver the service. Customer satisfaction has been measured as the customer's overall satisfaction with the service provider. This understanding of quality, dependability, speed of service delivery and customer satisfaction has been followed throughout the thesis.

The link between the operations performance indicators (dependability and quality) and customer satisfaction is the focus of this research (Parasuraman et al., 1988; Anderson and Sullivan, 1993; Cronin, 2000; Jones and Sasser, 1995; and many others). The theoretical foundation of these linkages lies in the Service Profit Chain (SPC) literature. The SPC connects service quality, employee satisfaction, customer satisfaction, loyalty, profitability and revenue growth under a single framework and rests on the seven propositions. A review of the literature provides evidence of the relationship between operations performance elements and performance outcomes; it fails, however, to provide enough empirical evidence of any research investigating the interrelationship among the operational performance indicators. Very few researchers have attempted to identify the interrelationship among the performance indicators and their work mainly

concentrates in the manufacturing context (Ferdows and De Meyer, 1990; Roth and Giffi, 1995; Rosenzweig and Roth, 2004). Therefore, this PhD research attempts to fill this gap in research by investigating the interrelationship among the operations performance indicators (dependability and quality) and their further effect on customer satisfaction in the context of information services. The next section elaborates on the aims and objectives of this research.

### **1.3 Research Aims and Objective**

The primary aim of this PhD thesis is to explore the linkage between dependability, quality and customer satisfaction in the context of information economy. This thesis studies cases taken from Business to Business (B2B) and Business to Customer (B2C) information intensive service firms. The different nature of the businesses requires this research to explore the service operations issues in both B2B and B2C information intensive service firms. This will add to the existing literature on B2B and B2C information services. Therefore, the research aims to explore the linkages between dependability, quality and customer satisfaction in both B2B and B2C information intensive service firms. The comprehensive literature review suggests that although the link between operations performance (dependability and quality) and customer satisfaction has been explored by researchers, research addressing them from information services viewpoint is lacking. Moreover, research studies focusing particularly on understanding the impact of operations performance on customer satisfaction and customer loyalty and with the aim of exploring the interrelationship among the operations performance indicators are also inadequate.

Realizing the existing gaps in the literature, this research aims firstly to explore the linkages between dependability, quality and customer satisfaction. This research seeks to test some of the pre-established theories in the literature and to extend this knowledge and understanding in the context of the information economy. Thus, the first objective of this research is;

- 1. To investigate the linkage between dependability, quality, and customer satisfaction in information service settings.*



This research sets out to provide empirical evidence of the linkages between the dependability, quality and customer satisfaction, widely discussed in the service quality literature. The first objective is located within the theory-testing stage of the research and provides the basis for further investigation in B2B and B2C information intensive service firms.

As already stated, the focus of this study is also on investigating the interrelationships among the operations performance indicators or more specifically, the most frequently discussed operations performance indicators in information service settings; dependability, quality and the delivery speed (just in one case study). The research also aims to test how this interrelationship further impacts on customer satisfaction. Therefore, the second objective of this thesis is;

- 2.a To investigate the interrelationship among the operations performance indicators (dependability, quality and speed)*
- 2.b How that interrelationship affects customer satisfaction?*

The empirical evidence of the interrelationships among the performance indicators is provided in this thesis. This research also attempts to analyse the relative effect of dependability and quality in information intensive B2B and B2C service firms. Thus, the final objective of this thesis is;

- 3a. To explore the relative effect of dependability and quality on customer satisfaction in B2B information intensive firms*
- 3b. To explore the relative effect of dependability and quality on customer satisfaction in B2C information intensive firms*

Objectives 2 and 3 of this PhD are located between the theory-development and theory-refining stages of the research. As pointed out earlier, there is a lack of research exploring the interrelationship among the operations performance indicators and how this further affects customer satisfaction. The empirical investigation of these relationships will provide a basis for theory-refining when comparing the outcome with the findings of some researchers who have worked in this area. This thesis moreover aims to explore these relationships in B2B and B2C information intensive service firms

that may lead to theory development in the information services context. The next section elaborates in detail on the significance of this research.

## **1.4 Significance of the Study**

The research highlights that service operation issues (links between dependability, quality and customer satisfaction) are of significant importance and need to be explored, specifically in the information service context. Realizing this, the thesis attempts to fill this gap by investigating different case studies from both B2B and B2C information service firms and provides empirical support to justify the key findings. The outcome of this research will add considerably to the theory and understanding of the service operations issues - such as the key drivers of customer satisfaction in B2B and B2C service settings, the relative significance of dependability and quality in both the businesses and the interrelationship between the operations performance indicators. The empirical supporting evidence will add to the literature on B2B and B2C businesses about the varying nature of the operations performance indicators vis-à-vis customer satisfaction. This understanding will furthermore provide practitioners with a better grasp of the nature of the information service sector and the customer interaction relationships in both businesses. This will also allow business practitioners to plan their strategies in such a way as to focus on the more important operational element.

Theory points out the links between operations performance indicators (quality, dependability, speed, etc.) and customer satisfaction. However, much of the attention in the literature is paid to analysing the individual links such as that between quality and customer satisfaction, between dependability and customer satisfaction and so on. There is however, a lack of research where quality, dependability, etc. have been treated as operations performance indicators. Studies that analyse the combined effect of these indicators on customer satisfaction or customer loyalty are also scarce. Therefore, this research fills this gap and broadens the current understanding of the links between operations performance indicators and customer satisfaction in information service settings. This research provides empirical evidence for several established models and propositions discussed in service quality literature such as identifying the key operations performance indicators, the quality and customer satisfaction link, and the dependability and customer satisfaction link.

This research further extends the current theory where little emphasis has been given to exploring the interrelationship among the operations performance indicators. This research further provides the empirical evidence on the interrelationships between the operations performance indicators and their effect on customer satisfaction. An understanding of the interrelationships shows how important this can be in achieving satisfaction and loyalty. Exploring the service operations issues in information-driven B2B and B2C firms adds further to the existing body of literature and provides useful theoretical understanding.

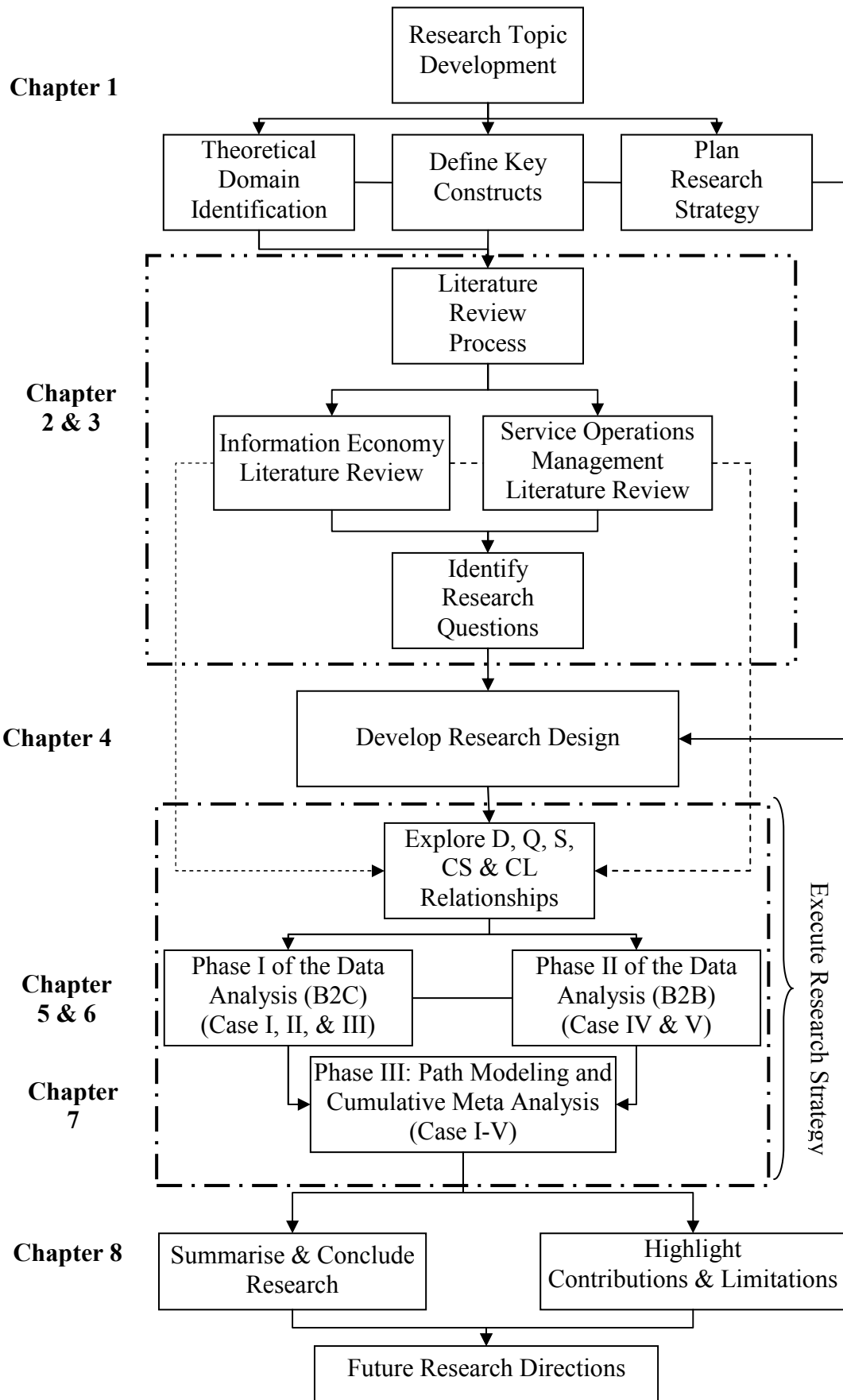
This thesis uses Path Analysis which is an established method for exploring causality and is frequently used in management and social science research. The use of Path Analysis provides support to the findings of the correlation and regression analysis in this research. The thesis aims to generalize the findings of this research in B2B and B2C information intensive services firms. Hence, to provide stronger support to the findings, this thesis also uses Cumulative Meta Analysis method. The Cumulative Meta Analysis method integrates the different research findings to provide a larger sample for the purpose of reaching a conclusion. The Cumulative Meta Analysis method has been used in this research to identify the consistency among the findings of all the cases studied. This PhD research, through triangulation and reinforcement of recent findings, provides a much-needed longitudinal perspective on service operations issues in information service settings. The next section elaborates on the organisation of this thesis.

## **1.5 Organisation of Thesis**

This thesis is organised into 8 chapters including the introduction. Figure 1.1 shows its structure, which divides the entire thesis into five parts; introduction, literature review, research methodology, data analysis and summary and conclusions. The upcoming sections will briefly outline the content of each chapter.

### **1.5.1 Chapter 2: Information Economy Literature Review**

Chapter 2 identifies the context of this thesis and builds a platform for the theoretical framework. The chapter presents a brief overview of the service economy from a



**Figure 1.1: Structure of the Thesis**

management and marketing researcher's viewpoint. The differences between services and goods have been pointed out in this chapter in order to provide readers with a clear

understanding of the service aspects. The information sector has been further differentiated as material and information-based services. The prime objective of this chapter is to highlight the worldwide growing significance of information services to the Gross Domestic Product (GDP) in most of the developing economies. The chapter argues that information services can be further categorised as B2B and B2C information services and they are different, since both businesses have different customer requirements. It is important therefore, to investigate the research questions in both B2B and B2C information service context. The chapter also shows the lack of contextual (information economy) research and concludes with the need to address the service operations issues in the information economy context.

### **1.5.2 Chapter 3: Service Operations Management Literature Review**

This chapter gives a brief overview of the service operations management literature and describes the theoretical constructs underpinning this research. The chapter outlines the history of service operations and the different stages of its evolution. Two important elements of the service operations model, the operational and customer elements were identified and emphasis was given to explain the service process and service outcome concept aligned with the objective of the thesis. A review of the literature identifies well established operations performance indicators in the manufacturing sector. This chapter goes further in exploring the operations performance indicators that are frequently addressed in information services firms and mainly focuses on the operations performance indicators; dependability, quality and the delivery speed. Research exploring the relationship between operations performance elements and performance outcomes is reviewed and some of the gaps in the research are also identified such as the lack of empirical research supporting the service profit chain (SPC) framework and the causality among the measures. In summary, the review of service operations management literature identifies the theoretical underpinnings and research questions that are subjected to empirical investigation later in the data analysis chapters.

### **1.5.3 Chapter 4: Research Methodology**

This chapter discusses the research philosophy, meaning the research methodology, research process and research design adopted. The chapter provides a brief overview of

the philosophical thinking prevailing in the social and management research and favours the positivist approach. This thesis follows a hypothetico-deductive approach in addressing the research questions. A detailed description of the quantitative research design strategy, including the steps in the research, is also outlined. The chapter discusses in addition the different methodological tools used in this thesis to investigate the research questions. A critical evaluation and justification of the multiple case study-method is presented. A discussion about the data collection methods and the conventional statistical methods is also presented. This chapter additionally introduces the Meta Analysis method and highlights its objective and significance in this thesis. The chapter concludes by highlighting some of the limitations associated with the adopted research methods and the research design.

#### **1.5.4 Chapter 5: Phase I of the Data Analysis**

The data analysis of this thesis was carried out in three phases. This chapter reports the findings of the first phase. Three case studies are analysed in this chapter taken from large B2C information service firms operating in the UK; one from a retail banking firm, one from a utility firm and the other from a telecommunication firm. The objective of this chapter is fourfold; *to analyse the relationship between operations performance and customer satisfaction; to analyse the relationship between operations performance and customer loyalty; to investigate the interrelationship among the operations performance indicators; and to test the relative significance of dependability and quality in driving customer satisfaction/loyalty in B2C information processing firms.* The first two case studies, taken from a retail bank and utility firm, analyse the relationship between the dependability, quality and customer satisfaction. The relationship between dependability, quality, speed and customer loyalty is investigated in the third case study taken from a telecommunication firm after operations performance and customer satisfaction link were verified in the first two cases. The interrelationship between the key operations performance indicators of quality, dependability and speed is also analysed. The number of propositions was tested and the analysis provided an empirical support to the research questions. This chapter concludes by pointing out that dependability is a key operational element that significantly affects customer satisfaction and loyalty, and a trade-off exist among the operations performance indicators.

### **1.5.5 Chapter 6: Phase II of the Data Analysis**

This chapter reports the findings from phase II of the data analysis. The aim of this chapter is also twofold; *to further test the findings of B2C cases in B2B case studies; and to investigate the interrelationship (causality) among the operations performance indicators*. The chapter reports the findings from the two B2B cases showing that for B2B firms both the elements of operations performance i.e. dependability and quality are of key importance opposing the B2C findings where only dependability emerged as a key indicator. The chapter urges the validation of the findings of all the case studies through Path Analysis and Meta analysis.

### **1.5.6. Chapter 7: Phase III: Path Modeling and Cumulative Meta Analysis**

This chapter introduces the Path Analysis method to investigate the causality among the measures. The objective of this chapter is threefold; *to further test the findings of the conventional statistical analysis; to explore the causality using Path Analysis tool; and to check the consistency among the findings of cases studies using Cumulative Meta Analysis method*. The chapter firstly reports the Path Analysis outcome and shows that an interrelationship exists between the operations performance indicators. Further the outcome shows that these operations performance indicators subsequently affect customer satisfaction. Finally, the chapter carries out the Cumulative Meta Analysis on the data sets from all the five cases studied in this research and provide a strong support for the generalizations of the findings in the information services context.

### **1.5.7 Chapter 8: Contributions**

The last chapter summaries the entire thesis and draws attention to the contribution of this research. The chapter starts by summarising the objectives of this research. The chapter then discusses and draws conclusions based on the findings from all three phases of the data analyses. A reflection on the research process adopted in this thesis is also presented. The chapter then indentifies the originality of the research and highlights its key contributions to the academic and practitioner community. It also highlights the limitations associated with this research and concludes by suggesting some future research directions.

# **Chapter 2**

## **Information Services**

### **Literature Review**



## **2.0 Introduction**

This chapter provides a brief overview of the service economy and its components, in particular the information services. The chapter starts by highlighting the growing significance of worldwide services and attempts to separate information services from material-based services. The chapter also outlines the complexity in defining services. A brief classification of services is also presented to enable readers to become acquainted with the basic classification schemes. The chapter discusses particularly two classifications, briefly: service as an experience and service as a process. There follows a detailed overview of the information service sector. The differences between Business to Business (B2B) and Business to Customer (B2C) services are also highlighted as is the need to explore the service operations issues in both business environments. The main objective of this chapter, as already stated, is to highlight the gap in the literature on information services.

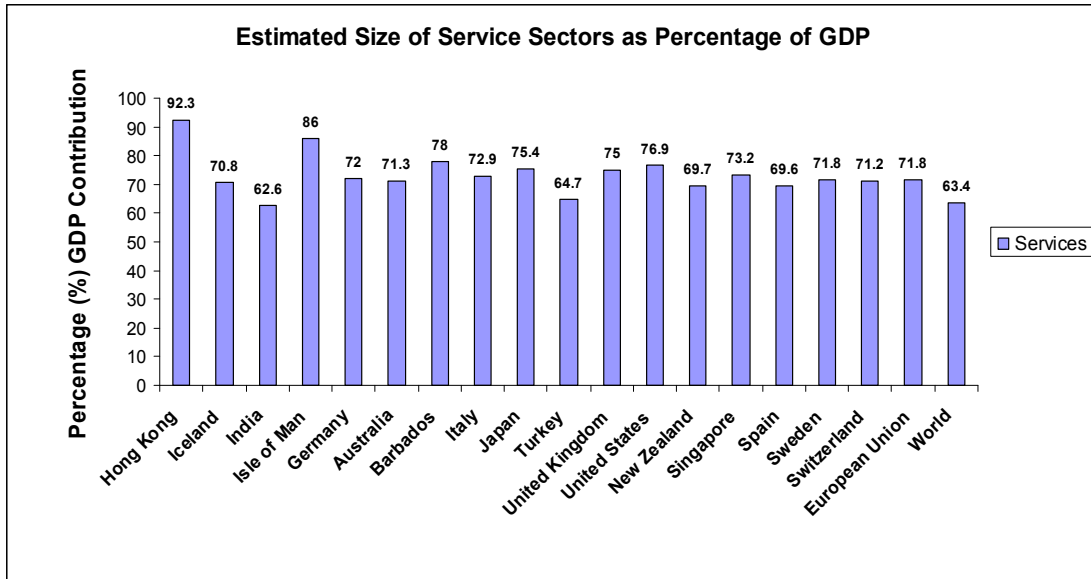
The chapter is organized as follows. Section 2.1 argues the dominance of services in the world economy and discusses the various definitions of ‘service’ from the viewpoint of various researchers. The differentiation of services from manufacturing goods has been outlined in section 2.1.1. Section 2.2 considers other classification schemes suggested by service science researchers and emphasizes mainly the two classifications: service as an experience and service as a process. The growing significance of the information service sectors in the service economy is discussed in Section 2.3. Section 2.3.1 differentiates information services from the material-based whereas 2.3.2 highlights the importance of the information services sector. Section 2.3.3 distinguishes between the B2B and B2C businesses and urges an exploration of the service operations issue in both businesses. The chapter then summarizes the key issues in Section 2.4 and concludes by pointing out the importance of, and need for, research in the information services sector.

### **2.1 Service Dominance**

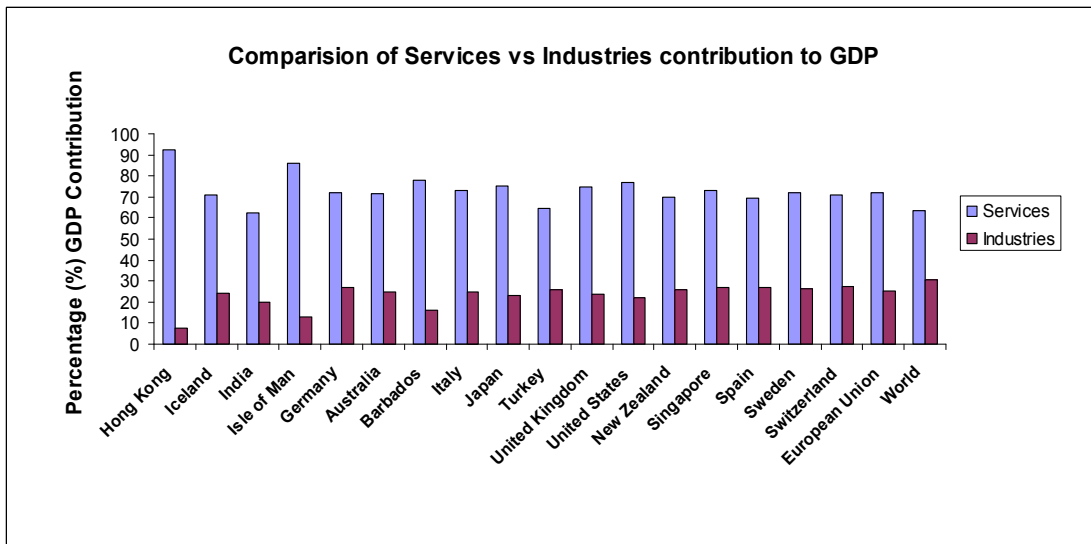
Services have attracted considerable attention from business entrepreneurs, researchers and governments worldwide, because of its unprecedented growth and increased

contribution to economies in the last few decades. Since the 1950s, services have grown steadily (Gummesson, 1994; Buera and Kaboski, 2006, Paulson 2006) and the modern world is dominated by services, as Lovelock and Wirtz (2007) observe ‘we live in a service economy’. A report by the OECD (2000) and Lovelock and Wirtz (2007) highlights that services contribute about 70% of the GDP in most of the developing economies; in the UK the contribution of services is around 73% of its GDP. A more recent report however indicates that, worldwide, the contribution of services has increased to 63.4% of the GDP (The World Factbook, 2010). Figure 2.1 (a) (The World Factbook, 2010) shows the estimated contribution of the service sector in some developing/developed economies as a percentage of their GDP in 2010. Figure 2.1 (b) shows the comparison between the contribution to GDP of service and industry. These figures clearly demonstrate the dominance of services (63.4%) in the world economy. Figure 2.2 shows the GDP by economic activity and expenditure and is taken from the report published by UNCTAD (2008) on Development and Globalization. Figure 2.3 shows the rise of the service economy in the US (Buera and Kaboski, 2006) from the 1870s to 2000. Although these statistics show that services have grown significantly and now make up the bulk of the GDP in most developing economies, the emergence of a general definition is still awaited.

A report published by OCED (2000) on the service economy argues that service activities are not directly involved in the production of goods, mining or agriculture, but involve human skills, experience and knowledge. Economists often interpret services as intangible commodities such as financial services, business services, educational service, and health services which can be bought and sold but cannot be touched or physically measured (Hill, 1999). Kovács (2008) points out that ‘services are the result of a production activity that changes the condition of the consuming unit, or facilitates the exchange of product or financial assets’. Murdick et al. (1990) define services as ‘economic activities that produce time, place, form or psychological utilities’. Edvardsson (1997) views services as a part of a wider concept of the product, where the customer is most often involved as a co-producer in the production process, while a service is created in and during a process. Lovelock and Wirtz (2007), on the other hand, define services as ‘economic activities offered by one party to another, most commonly employing time-based performances to bring about desired results in recipients themselves or in objects or other assets for which purchasers have responsibility’.



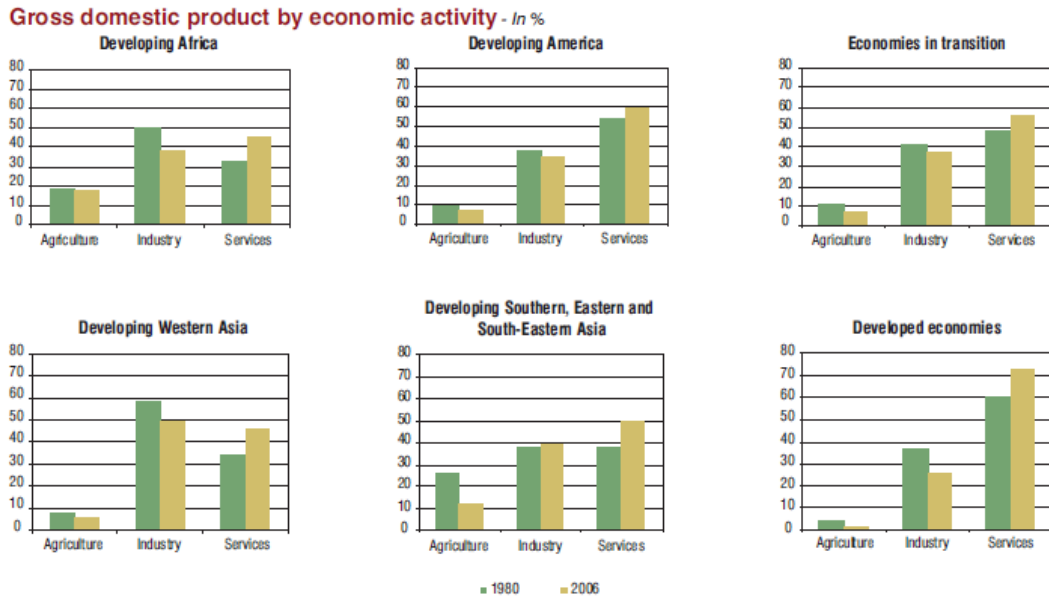
(a)



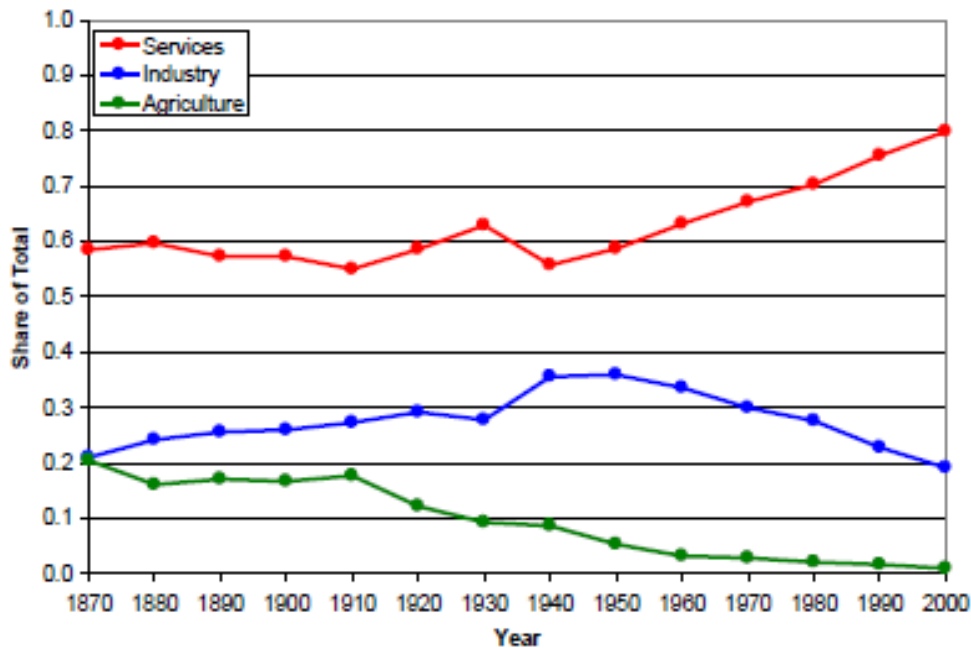
(b)

**Figure 2.1: Estimated Size of Service Sectors as Percentage of GDP in 2010**  
**(Source: The World Factbook 2010, CIA)**

Services are often defined as being different from manufacturing, as intangible and involving customers' participation during the consumption and production stages. Separating a tangible component from services is, however, arguable, as many services involve both tangible and intangible components, such as restaurants and airlines, where, apart from the intangible services, a customer also experiences tangible components - the aircraft, the food, and the staff. These varying definitions of services suggest that researchers still need to come up with a common definition of services.



**Figure 2.2: GDP by economic activity and expenditure**  
 (Source: UNCTAD 2008: Development and Globalization)



**Figure 2.3: Late rise of the Service Economy in US**  
 (Source: Buera and Kaboski, 2006)

This notion was also supported by the findings of Edvardsson et al. (2005) who carried out a critical review of the way service is portrayed in research. Their findings point out that all the service definitions are at an abstract level and can be operationalized and interpreted in a number of different ways. Consequently Edvardsson et al. (2005) urge researchers to define services through the customer's perspective, focusing on value in

use (Vargo and Lusch, 2004 a, b). These findings indicate that researchers are still striving hard for a consensus on a common definition of services. Table 2.1 shows a list of services adapted from the report published by OECD (2000). The following sections deal with both the different perspectives on and the classification schemes for services. The customer involvement in the production process makes services far more complex than goods. The next section will therefore emphasise how services differ from manufacturing goods from the viewpoint of several researchers.

**Table 2.1: Illustrative List of Services  
(OECD, 2000; Source: Based on the US Bureau of Census, 1999)**

Service	Activities Related to the:
Wholesale and retail price	Sale of goods
Transportation and warehousing	Distribution of goods
Information	Gathering and dissemination of written, audio or visual information, including films and records
Finance and insurance	Facilitation of financial transactions, including those related to risk management
Real estate, rental and leasing	Temporary transfer of property, and the temporary or definitive transfer of real estate
Professional, scientific and technical	Provision of specialised, generally “knowledge based”, expertise (e.g. legal, accountancy and engineering)
Management of companies and enterprises	Management of companies and enterprises, such as holding companies
Administrative and support, and waste management	Day-to-day support of other organisations (e.g. clerical assistance agencies, travel agencies and personnel firms)
Education	Provision of instruction and training (e.g. schools and specialized training centres)
Health care and social assistance	Provision of healthcare and social assistance (e.g. doctors, hospitals and clinics)
Arts, entertainment and recreation	Provision of entertainment in a broad sense (e.g. museums, opera, theatre, sports and gambling establishments)
Accommodation and food services	Provision of lodging, or the provision of meals, snacks or beverages
Public administration	Governing or administration of public entities and programmes
Other	Provision of personal services, repair and maintenance activities, professional societies, religious institutions, etc.

### **2.1.1 Services Vs Manufacturing Goods**

Services separate themselves from goods in several ways. The characteristics of services i.e. intangibility, heterogeneity, perishable nature, and customer involvement in service production, differentiate them from manufacturing goods, a fact identified by many researchers (Lusch and Vargo, 2006; Sampson and Froehle, 2006; Qiu, 2007; Spohrer et al., 2007, etc.). Goldstein et al. (2002) claims that ‘unlike products, services are not tangibles rather than it is a combination of knowledge, skills, processes, experiences and materials that must be appropriately integrated to result in the planned or designed service’. These characteristics have also been supported by Lusch and Vargo (2006), and Spohrer et al. (2007).

Vargo and Lusch (2004a,b) also emphasize that the term ‘service’ should be thought of as focussing on process, rather than viewing them just as intangible goods, since services are simultaneously produced while being consumed, with the active participation of customers in the service production. Abe (2005:13) also argues that services are intangible, in that services ownership rights are not transferable and services are difficult to compare/assess before the purchase. Abe (2005) however further emphasizes that out of these characteristics the assessment of services prior to purchase is of the most importance from the services viewpoint, since it challenges the service provider over the pricing of services and, at the same time, poses risk uncertainty on the customers’ side.

Rathmell (1966) provided a marketing perspective on services to differentiate them from goods. Goods are transportable commodities whereas many services are non-transportable. One example of a non-transportable service is hair-cutting, where, in order to use the service, both hairstylist and customer should be present at the same time. In contrast, parcel delivery is an example of transportable service. Therefore, transportability is not a distinct feature of services. Dietrich and Harrison (2006) also point out further that demand and capacity management in services are far more complex than in the manufacture of goods and are crucial for profitability. Lovelock and Wirtz (2007:17) highlight eight common differences from a marketing perspective between services and goods:

1. Most service products cannot be inventoried
2. Intangible element usually dominate value creation

3. Services are often difficult to visualize and understand
4. Customers may be involved in co-production
5. People may be part of the service experience
6. Operational inputs and outputs tend to vary more widely
7. The time factor often assumes great importance
8. Distribution may take place through non-physical channels

Services are usually differentiated from manufacturing goods based on the IHIP characteristics i.e., intangibility, heterogeneity, inseparability and perish-ability. However, the separation of services on the IHIP characteristics has been challenged by some researchers such as Lovelock and Gummesson (2004) and Edvardsson et al. (2005). They also identify the absence of ownership in service purchases and challenge generalizations of the IHIP characteristics in all services. Table 2.2 gives an overview of the IHIP characteristics and associated criticisms from some researchers'. Table 2.2 clearly indicates that IHIP characteristics do not apply to all services and thus, separating services on IHIP characteristics for many services is questionable.

<b>Table 2.2: An overview of the IHIP characteristics and its associated criticisms in services</b>		
	<b>Common understanding in literature (Moeller, 2010:362)</b>	<b>Associated Criticisms</b>
<b>Intangibility</b>	<ul style="list-style-type: none"> <li>• Not being palpable or material</li> <li>• A good is an object, a device, a thing; a service is a deed, a performance, an effort</li> </ul>	<ul style="list-style-type: none"> <li>• Lovelock and Gummesson (2004) and Edvardsson et al. (2005) report that intangibility is primarily associated with post purchase activities and many services often involve tangible performance activities, during the service delivery process, such as haircutting, surgery and cleaning.</li> <li>• Vargo and Lusch (2004) assert that tangibility is considered to be providers perspective, and customer usually does not make distinction between tangible and intangible offerings</li> </ul>
	<ul style="list-style-type: none"> <li>• Difficulty in standardizing services</li> <li>• Related to outcome, production performance</li> </ul>	<ul style="list-style-type: none"> <li>• Lovelock and Gummesson (2004) challenged the generalisation of heterogeneity concept and argue that variability is evidenced not only in labour intensive services but also in</li> </ul>

<b>Heterogeneity</b>	of different producers or persons, over a certain period of time or participation of customers.	<p>manufacturing industries in the form of consumer complaint data and product recalls etc.</p> <ul style="list-style-type: none"> <li>• Lovelock and Gummesson (2004) and Moeller (2010) also criticize heterogeneity as services characteristics, since in services there are plenty of possibilities for standardization, for example retail bank offering an ATM service.</li> </ul>
<b>Inseparability</b>	<ul style="list-style-type: none"> <li>• Production and consumption occur simultaneously</li> <li>• Service provider is often physically present when consumption takes place</li> <li>• Services are first sold, then produced and consumed simultaneously, whereas goods are first produced, then sold and afterwards consumed</li> </ul>	<ul style="list-style-type: none"> <li>• Lovelock and Gummesson (2004) argue that many services are separable, such as laundering clothes and transporting freights that are performed mostly in the absence of customers.</li> <li>• Johns (1999) points out that transporting freight is mostly performed in the absence of the customers. Moreover, in case of many manufacturing goods the customers do participate in the earlier phase of the production process such as during the assembly of customized computer hardware, automobiles and houses.</li> </ul>
<b>Perish-ability</b>	<ul style="list-style-type: none"> <li>• The performance does not fix or realize itself in any particular subject or vendible commodity</li> <li>• The unavailable option of storing or stockpiling services</li> </ul>	<ul style="list-style-type: none"> <li>• Lovelock and Gummesson (2004) argue that productive capacity is perishable in both manufacturing and service businesses and in both instances is wasted if unused.</li> <li>• Gummesson (2000) dislikes the fact that services are stored in systems, buildings, machines, knowledge and people: the emergency clinic, for example, is a store of skilled people, equipment and procedures.</li> </ul>

These findings highlight the complexities involved in differentiating services from commodity goods. However, the findings by Lovelock and Gummesson (2004) and Edvardsson et al. (2005) claim that service research is already established as a discipline and there is no longer any need to differentiate goods from services. They emphasize too that now the differentiation in services should be based on how we want to describe the value creation from the customer's perspective. Researchers have classified services in various ways, such as high to low contact, equipment to people- based services, and convenience- to preference-based services. The next section examines some of the service classifications suggested by researchers.



## 2.2 Service Classification

The previous section highlights in detail the separation of goods versus services. Qiu (2007) reports that services delivered by the service firms are geared mostly to groups such as Financial, Medical, and Education services. However some service providers deliver to other industrial organisations (e.g. call centres, ERP, IT etc.) and they have shown rapid growth in recent years (Dietrich and Harrison 2006). These studies indicate several ways to classify services. Lovelock (1983) presents a brief classification of services (Table 2.3) based on the perception of various researchers between the 1960s-1980s. Table 2.4 further shows several other classifications from different perspectives highlighted by researchers between 1990 and 2004. In his study Abe (2005) refers to the work of Kiyomizu (1994) who classified services into broadly three categories: (1) Intellectual and Spiritual Services; (2) Behavioural Services; and (3) Business and Operational services. Kiyomizu (1994) also stressed the interconnectedness among the classifications. In addition, Abe (2005) highlights Kiyomizu's (1994) further subdivision of the business and operational services into four categories (Abe, 2005:11) as,

1. Services focusing on work service, specialized skills, and human knowledge and information, with little connection to commodity goods
2. Service providing commodity goods/equipment: commodity goods that provide intangible value
3. Services handling money i.e. financial services
4. Services handling information not provided by a human being - specialised information services for information gathering, information processing, information storage, information transmission and information production

The following sections will discuss mainly the two classifications of services: in brief service as an experience and service as a process.

<b>Table 2.3: Summary of Previously Proposed Schemes for Classifying Services (Source: Lovelock, 1983)</b>		
<b>Author</b>	<b>Proposed classification scheme</b>	<b>Comment</b>
Judd (1964)	(1) Rented goods services (right to own and use a good for a defined time period ) (2) Own goods services, (3) Non goods services (personal experiences or “experiential possession”)	First two are fairly specific, but third category is very broad and ignores services such as insurance, banking, legal advice and accounting
Rathmell (1974)	(1) Type of seller (2) Type of buyer (3) Buying motives (4) Buying practice (5) Degree of regulation	No specific application to services- could apply equally well to goods
Shostack (1977)* Sasser et al* (1978)	Proportion of physical goods and intangible services contained within each product “package”  * These were two independent studies that drew broadly similar conclusions	Offers opportunities for multi-attribute modeling. Emphasize that there are few pure goods or pure services
Hill (1977)	(1) Services affecting persons vs. those affecting goods (2) Permanent vs. temporary effects of the service (3) Reversibility vs. non-reversibility of these effects (4) Physical effects vs. mental effects (5) Individual vs. collective services	Emphasize nature of service benefits and (in 5), variations in the service delivery/consumption environment
Thomas (1978)	(1) Primarily equipment based (a) Automated (e.g., car wash) (b) Monitored by unskilled personnel (e.g., movie theatre) (c) Operated by skilled personnel (e.g., airline) (2) Primarily people based (a) Unskilled labour (e.g., lawn care) (b) Skilled labour (e.g., repair work) (c) Professional staff (e.g., lawyers, dentists)	Although operational rather than marketing in orientation, provides a useful way of understanding product attributes
Chase (1978)	Extent of customer contact required in service delivery (a) High contact (e.g., health care, hotels, restaurants) (b) Low contact (e.g., postal service, wholesaling)	Recognizes that product variability is harder to control in high contact services because customers exert more influence on timing of demand and service features, due to their greater involvement in the service process
Kotler (1980)	(1) People-based vs. equipment-based (2) Extent to which client’s presence is necessary (3) Meets personal needs vs. business needs (4) Public vs. private, for profit vs. non-profit	Synthesizes previous work, recognizes differences in purpose of service organization
Lovelock (1980)	(1) Basic demand characteristics <ul style="list-style-type: none"> <li>• Object served (persons vs. property)</li> <li>• Extent of demand/supply imbalances</li> <li>• Discrete vs. continuous relationships between customers and providers</li> </ul> (2) Service content and benefits <ul style="list-style-type: none"> <li>• Extent of physical goods content</li> <li>• Extent of personal service content</li> <li>• Single service vs. bundle of services</li> <li>• Timing and duration of benefits</li> </ul> (3) Service delivery procedures <ul style="list-style-type: none"> <li>• Multisite vs. single site delivery</li> <li>• Allocation of capacity (reservations vs. first come, first served)</li> <li>• Independent vs. single collective consumption</li> <li>• Time defined vs. task defined transactions</li> <li>• Extent to which customers must be present during service delivery</li> </ul>	Synthesize previous classifications and adds several new schemes. Proposes several categories within each classification. Concludes that defining object served is most fundamental classification scheme. Suggests that valuable marketing insights would come from combining two or more classification schemes in a matrix

**Table 2.4: Service classification from different researchers viewpoint (1990-2004)**

<b>Researchers</b>	<b>Service Classification</b>
Silvestro et al. (1992)	<ul style="list-style-type: none"> <li>• Professional Services</li> <li>• Mass Services</li> <li>• Service Shops</li> </ul>
Apte and Mason (1995)	<ul style="list-style-type: none"> <li>• In-sourcing Services</li> <li>• Outsourcing Services</li> </ul>
Nie and Kellogg (1995)	<ul style="list-style-type: none"> <li>• Service process structure based on customer influence</li> <li>• Service package structure based on customisation</li> </ul>
Stell and Donoho (1996)	<ul style="list-style-type: none"> <li>• Convenience Services</li> <li>• Preference Services</li> <li>• Shopping Services</li> <li>• Speciality Services</li> </ul>
Lovelock and Yip (1996)	<ul style="list-style-type: none"> <li>• People-processing services</li> <li>• Information-processing services</li> <li>• Possession-processing services</li> </ul>
Karmarkar (2004)	<ul style="list-style-type: none"> <li>• Standardized Services</li> <li>• Customized Services</li> </ul>

### **2.2.1 Service as an experience**

Johns (1999) provides a brief overview of services by looking at them from different perspectives. One classification suggested by him sees services from the customer's perspective. Customer evaluation of services is pointed out by many researchers and is often termed service quality (Parasuraman et al., 1986, Klaus, 1985, Zeithaml et al., 1990). Johns (1999) indicates that different customers experience services in different ways and thus have different opinions about the service provider. Customers for example have different opinions about a particular restaurant that is guided by their own experience during their visit. Galetzka et al. (2006) support this notion and further point out that, based on the service experience, customer satisfaction can vary. A customer goes through both pre-purchase and post-purchase experiences and, hence, experience is

an integral part of services. These findings have also been recognised by many other researchers (Parasuraman et al. 1986; Johns 1999; Galetzka et al. 2006). The complex nature of service, due to simultaneous production and consumption, makes the assessment of services more difficult than that of manufacturing goods (Zeithaml, 1981). Meyer and Schwager (2007) point out that customer satisfaction is a series of cumulative customer experiences and, therefore, it is very important for a service provider to focus on individual components of customers' experiences.

The relationship with customers is vital for the success or failure of the service firm's business. A good service experience may lead to satisfied and loyal customers while, in contrast, a poor service experience may result in customer dissatisfaction and even a loss of a customer's business in the future. Therefore, service firms need to pay considerable attention to customer evaluation of services i.e. service quality aspects. They also need to keep in mind that the service experience is the key to the service firm's future growth and long-term relationship with their customers; hence firms must ensure that they provide the best service experience to their customers. The quality and its relationship with customer satisfaction and loyalty will be discussed in detail later in Chapter 3. The next section gives an overview of the classification of the services as a process.

### **2.2.2 Service as a Process**

The term 'process' is commonly used in the manufacturing context and involves input, transformation and output (Zairi, 1997). Johns (1999) also acknowledges that the term 'process' has a close association with the manufacturing industry and systems theory. However, in manufacturing industries goods are processed and delivered to customers, whereas in services either the customer or the information is processed (Morris and Johnston, 1987). The foundation of the concept of services as a process was initially highlighted by Grönroos (1988) who sees services as activities. This concept was further supported in the work of Mohr and Bitner (1995) and Johns (1999). Shostack (1987) also stresses that services are processes and emphasizes that, during the service process, production and consumption occur simultaneously. The process-oriented view of services involves customers' active participation. This shows that service firms rely on customers, and the information provided by them, to deliver the final product back to the customers. As Morris and Johnston (1987) point out, in the service industry

processes are often bought rather than the products. Therefore, the process view of services is vital for better understanding.

Customer participation in the process of production and delivery of services was also recognized by Nie and Kellogg (1995). Services can be further categorised either as customer-processing services or information-processing services. Shostack (1987, 1992) emphasizes customer involvement in the service process and relates it to blueprinting in manufacturing. Customer participation during the service production and consumption however makes the service process different from the manufacturing equivalent (Hill, 1999; Zeithaml et al., 1985). Gummesson (1995) further highlights customers' much earlier participation in the services process and their influence on the service outcome. Johns (1999), on the other hand, point out that this view is being challenged as, nowadays, customers do get involved in the earlier phase of the production processes in the manufacturing industries such as, the construction and assembly of customized automobiles, computers and houses.

Service operations rely on customer participation and the information provided by the customers as input that finally is transformed into the service output. Morris and Johnston (1987) highlighted the importance of process control in service firms to maintain the service quality. Additionally, they point out that in manufacturing firms, the products and processes can be easily monitored but, in the service industry, the monitoring process is relatively difficult, as it contains intangible elements. Nevertheless, Morris and Johnston (1987:34) argue that in service organisation it is possible to identify factors which contribute to an acceptable level of customer treatment and monitor them in a similar way to manufacturing operations. Nowadays, service organisations follow both the standardized and customized processes to meet their customer's need.

These findings suggest that services can be classified from the viewpoint of process. Moreover, a process-based classification of services provides a much deeper insight into the management perspective (Morris and Johnston, 1987). Accepting the importance of a process-oriented view of the service, this study is situated in the context of information-processing services. The next section will highlight what the information economy is all about, how it differs from the materials- based economy and why there is a need to explore the service operations issues in this context.

## **2.3 Perspective of the Information Service Sector**

The previous sections highlight the unprecedented growth of the service economy in most industrialized countries and present some of the major classification methods. Although a number of classifications of services have been studied, very few researchers have looked at the information service sector (Porat and Rubin, 1977; Apte and Mason, 1995; Heineke and Davis, 2007; Lovelock and Wirtz, 2007; Apte and Nath, 2007; Karmarkar and Apte, 2007; Godin, 2008). The information sector, as has already been stated, has shown rapid growth in the last decade. Recent research by Karmarkar and Apte (2007) shows the dominance of information services in today's economy. The information sector has evolved in three stages over the last fifty years from the era of information as knowledge to information as technology, through to information as an economic activity (Godin, 2008).

Manufacturing industries primarily focus on producing goods; in contrast the information industries are involved in the production, processing and transmission of information which all carry economic value. Porat (1977:2) defines information as 'a data that have been organized and communicated' and points out further that 'information activities include all resources consumed in producing, processing and distributing information and goods'. In a recent study, Karmarkar and Apte (2007) define data as 'everything that can be sensed and can be converted into a symbolic representation' and they further stress that 'information is a subset of data, which is relevant, accurate, timely, and concise'. These conclusions suggest that the information sector has become an integral part of the service economy which deals with the handling and processing of the data, and produces economic value that contributes to the GDP/GNP of the economy.

A report published by Godin (2008) highlights the history of the information economy from 1949 to 2005. During the last fifty years, any developed or developing economy has evolved through a goods or manufacturing-oriented economy to a service oriented one and now has moved on to the information-oriented economy. Reading the literature produced over the last fifty years, two well-known early studies emerge that attempt to define the information economy. Machlup (1962), who discusses the knowledge industry and Porat and Rubin (1977) who attempt to measure the US information economy in 1967. They were the first researchers to provide a real examination of the

information economy. In his seminal work Machlup (1962) first identifies the contribution of the knowledge industry to be around 29% of the US Gross National Product (GNP) in the year 1958. In the late 70s Porat and Rubin (1977) measured the size and structure of the US information economy in 1967. Their findings reveal that the information sector contributed around 46% of the US GNP in 1967. Murdick et al. (1990) further report, in their seminal book 'Service Operations Management', using the Machlup's method that in the 1980s the contribution of the information sector (banking, education, broadcasting, legal, management consulting, etc.) was around 34% of US GNP. In a recent study Apte and Nath (2007) conclude that the contribution of the information sector to US GNP rose to around 63% in 1997. These statistics over the time-span highlight the growing dominance of the information sector in the service economy. The next section outlines the categorization of the information economy into primary and secondary information sectors and distinguishes the information- from the material-based services.

### **2.3.1 Material versus Information Services**

The previous section defined the information economy and highlighted the growing dominance of the information sector in most developing economies. A report published by the OECD (2000:14) points out that the growth in the information economy is driven by a wide range of factors, such as outsourcing, rise of knowledge-based economies, the growth of SMEs, increased reliance on external services to supplement internal resources, specialisation and the increased division of labour, and a requirement for greater flexibility within firms. There have been some attempts to classify the information service sector. Porat and Rubin (1977) first divide the information service sector into two parts: (1) The Primary information sector and (2) The Secondary information sector. The first includes all industries that are involved in the production of goods and services that basically transfer information or are used directly in producing, processing or distributing information for an established market (Karmarkar and Apte 2007; Apte et al. 2008). Therefore, the primary information sector includes both information goods, such as TV sets, computers and CDs and broadcasting, telecommunications and financial services. Porat and Rubin (1977:15) further point out that, within the primary information sector, there are eight major classes of industries. They are,

- i. The knowledge production and invention industries (R&D, private information service, etc.)
- ii. Information distribution and communication industries (Education, telecommunications, etc.)
- iii. Risk management industries, including components of finance and insurance (insurance firms, financial firms, etc.)
- iv. Search and coordination industries, including all market information and advertising vendors (Advertising, brokerage, etc.)
- v. Information processing and transmission services, electronic and non- electronic (retail banking, telecommunications, utility, etc.)
- vi. Information goods industries, including information machines (computers, mobile phone, electronic parts, etc.)
- vii. Selected government activities, including postal service and education
- viii. Support facilities such as office and education buildings.

**Table 2.5: A framework for categorizing major industry sectors in the information economy, combining the product-service and material-information dichotomies**

(Source: Karmarkar and Apte, 2007:440)

End Market	Delivery form	
	Product (Manufacturing)	Process (Services)
Material	Chemicals	Transportation
	Steel, Cement	Construction
	Automotive	Maintenance and repair
	Aerospace	Hospitality and tourism
	Industrial Equipment	Retailing
Information	Computers, Optical Fibers	Telecommunications
	TV sets, Radios, PDAs	Broadcast services
	Books, CDs, DVDs	Financial services
	Music, Software	Professional services
	Databases	Education

The secondary information sector includes all information services produced for internal consumption by governments and non-information firms. It has already been pointed out that information activity includes all resources used in producing, processing and distributing information and goods (Porat, 1977) i.e. it includes both the material and information elements. The information economy therefore can be further sub-divided into the information processing and the material processing services. Karmarkar and Apte (2007) first covered this area and presented a useful material versus information dichotomy. They present a  $2 \times 2$  table overlaying the product versus services, and



material versus information dichotomies as shown in Table 2.5. Although Table 2.5 provides a product and process division of industries into material and information sectors, many industries include components which fall under both classifications. For example transportation and healthcare industries equally belong to both sectors, a fact also acknowledged in the work of Machlup (1962), Porat and Rubin (1977), and even Karmarkar and Apte (2007). However, the division of the industries in the material and information sectors suggests that both is distinct entities and must be treated separately.

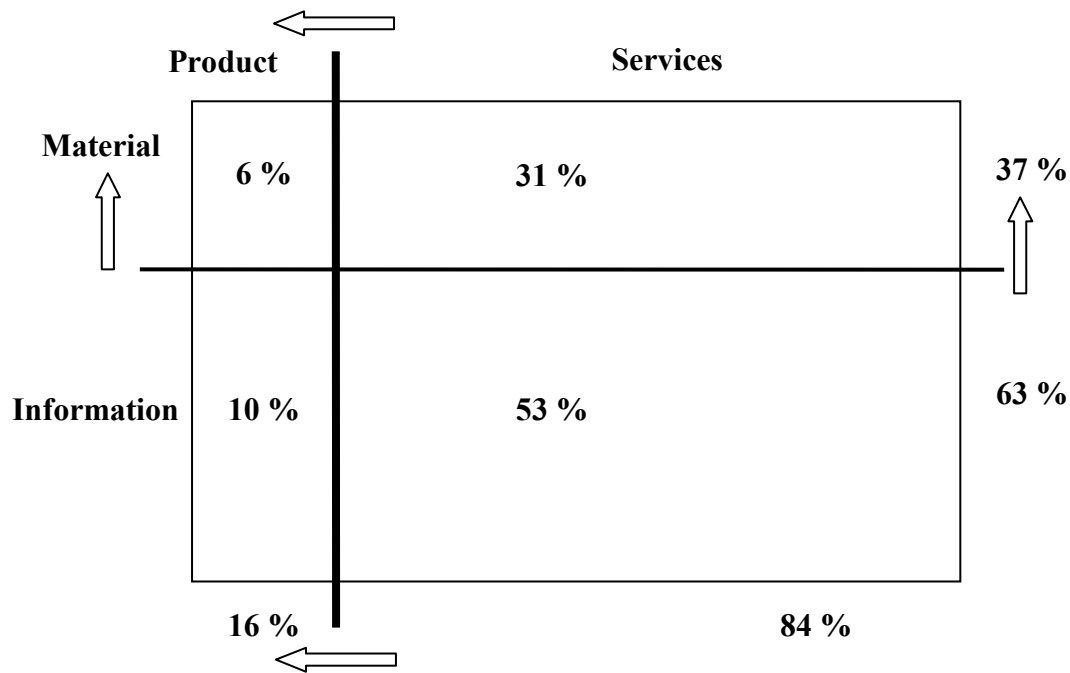
In the book ‘Word Matters’ (Ambrosi et al., 2005) Verzola signifies that information is a non-material entity which requires material or energy only when it needs to be transferred or stored. He further differentiates the information economy from material goods by pointing out that the production of information goods may cost significant amounts of matter or energy, while the reproduction of information goods costs practically nothing. Lovelock and Wirtz (2007) also distinguish information-based services from physical or material services in their eight petals of the ‘flower of service’<sup>1</sup>. They also highlight the growing importance of information over physical processes. These findings identify the information sector as very different from the material sector. However, as discussed earlier, the information sector delivers both the information products (mobiles, TV, computers etc.) and the information services (broadcast, telecommunication, financial services etc.). This further categorisation of the information economy into products and services proposes that they should be treated separately; likewise manufacturing and goods. The next section stresses the importance of the information economy in the present era.

### **2.3.2 Importance of Information Services**

The information sector has therefore grown significantly in the last couple of decades as has the contribution of the information economy to the GDP. Karmarkar and Apte (2007) presented a comparative graphical representation of the distribution of the GDP in the US economy in 1997 (Figure 2.4) to show the growing importance of the information sector vis-à-vis the material-based services. Figure 2.4 shows that in 1997 the contribution of information products and services to the US economy were almost

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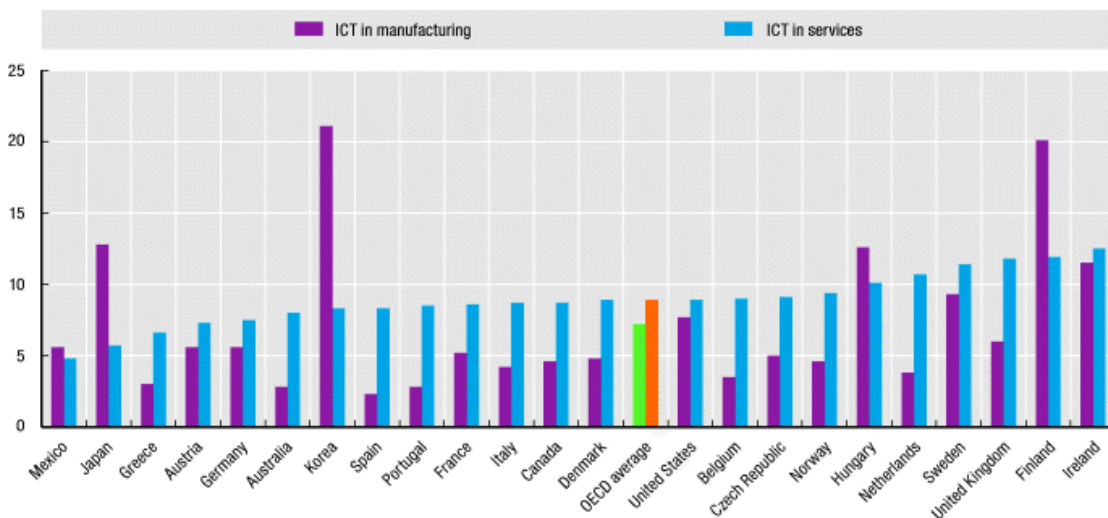
<sup>1</sup> The ‘flower of service’ concept was first introduced by Christopher H. Lovelock, ‘Cultivating the Flower of Service: New Ways of Looking at Core and Supplementary Services’, in P. Eiglier and E. Langeard (Eds.), *Marketing, Operations, and Human Resources: Insights into Services*. Aix-en-Provence, France: IAE, Université d’ Aix-Marseille III, 1992, 296-316



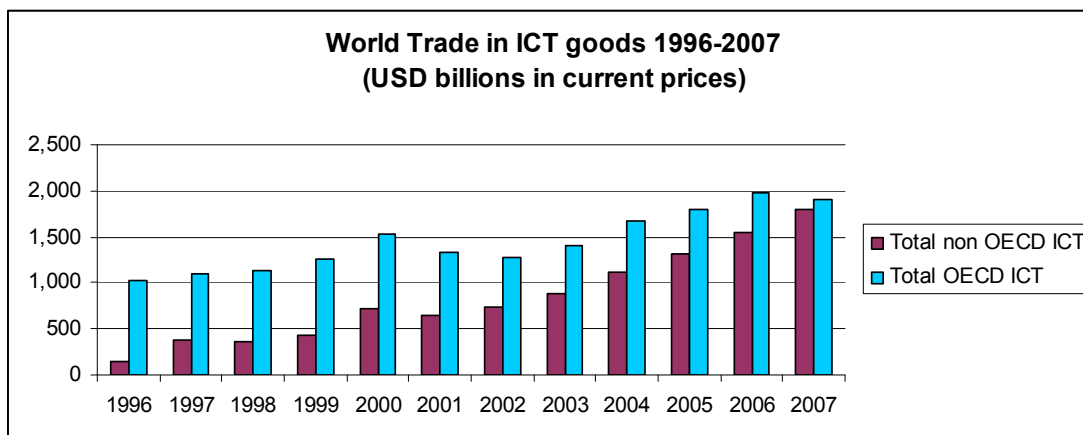
**Figure 2.4: Distribution of GDP in the US economy in 1997, excluding government, agriculture and mining. The information sector includes both primary and secondary information sectors (Source: Karmarkar and Apte, 2007:440)**

double that of material products and services. The significant growth in the information sector is mainly driven by the technological changes. The development in information and communication technologies (ICTs) in more than a decade has revolutionised the ways in which we present and collect information and knowledge (OECD 2000; OECD 2009). The development of modern, large storage, transportation and transmission capabilities, the creation of information processors and end-to-end information and online technologies, such as the internet and the web, has caused significant changes in the information sector (Karmarkar and Apte, 2007; Apte et al., 2008). Figure 2.5 shows the share of the value, added by the Internet and Communication Technologies (ICTs), in the manufacturing and service sectors. The graph highlights that, in a majority of countries, the contribution of ICT in services is surpassing the manufacturing sector, except for the few countries which are manufacturing-dominated economies. For example, ICT contribution to services in UK, Denmark, Canada and Netherlands is higher than its contribution to manufacturing sector. However, in Korea, Japan and Finland ICT contribution is higher for manufacturing sector than those in services. Nevertheless, the increasing share of ICTs in both sector shows that slowly world is moving towards information driven economy. The green and orange line in the middle of the graph shows the OECD average contribution of ICT in manufacturing and services. Figure 2.6 (OECD 2008) illustrates the world trade in ICT and non-ICT goods

from 1996-2007 and highlights the overall dominance of ICT goods. The future, in other words, is going to be the information- based economy, which will capture a majority of market share and provide most employment opportunities.



**Figure 2.5: Share of ICT manufacturing and ICT services value added, 2006**  
(Source: OECD Factbook, 2009)



**Figure 2.6: World trade in ICT and non ICT goods (Data Source: OECD 2008)**

This PhD research emanated from the growing significance of the information sector in most developing economies. A comprehensive review of the relevant literature revealed that very few researchers have actually explored this sector (Machlup, 1962; Porat and Rubin, 1977; Kramarkar and Apte, 2007; Apte et al., 2008; and others). Recognizing this lack of research, my thesis attempts to fill the gap by exploring the service operations issues in information-processing firms. This research is also focused on studying the service operations issues in Business to Business (B2B) and Business to Customers (B2C) information services firms, as they are two different businesses. Studies highlight that B2B and B2C businesses have different customer requirements

(Parasuraman and Zinkhan, 2002; Minett, 2002; Barschel, 2004; and others). The next section explores in detail the differences between B2B and B2C businesses.

### **2.3.3 B2B and B2C Services**

In general B2B businesses deal with the provision of products and services to other businesses, whereas B2C businesses deal with providing products and services to the end-user consumers (Killen & Associates, 2000; Parasuraman and Zinkhan, 2002). Previous sections have emphasized that the growth in information technology in recent years has revolutionized the way in which B2B and B2C organizations interact with their customers (Bhappu and Schultze, 2006). In their study Zhao et al. (2004) revealed that the advancement of the internet and web technologies has facilitated the ways B2C and B2B firms offer services to their customers. The prime difference between B2B and B2C businesses relates to customer requirements. This difference has been widely supported by researchers, both theoretically (Cooke, 1986; Lilien, 1987; Homburg and Fürst, 2005) and empirically (Avlonitis and Gounaris, 1997; Coviello and Brodie, 2001). IBM iSeries Information Centre (e-business and web serving; link [1]) and some researchers (Eckles, 1990; Minett, 2002; Barschel, 2004) report that B2B businesses have certain unique characteristics that set them apart from the B2C businesses, these are;

- *Different types of purchases and authorizations*

B2B businesses typically involve bigger unit purchases, employ professional buyers, managers, distributors, business partners or often groups of people; orders are governed by complex business rules, and require more certain and predictable order fulfilment. In addition, B2B buyers are more likely to arbitrate multiple sources of supply to ensure availability and price (Phillips and Meeker, 2000). Moreover, in B2B businesses buying process is much longer compared to B2C businesses and involves many people. B2C businesses on the other hand often involve individual purchases.

- *Unique contracts, terms, and conditions for different business customers*

B2B businesses involve more complex decision-making processes, require a high level of sophistication because of the participant's professional experience, and often have longer buying times i.e. time horizon for order completion may vary from a few weeks to many months or even years whereas, B2C orders usually have a short life span.

- *Participation in customer's supply chain*

B2B businesses involve a flexible pricing strategy along the supply chain, to conquer large markets and rely heavily on relationship-selling. Hence, B2B businesses aim to maximize the value of the relationship to create business value. B2B is usually associated with buying and selling information, products and services by using private networks shared among business partners. B2B also allows companies to synchronize activities such as product design, procurement, transportation planning, production planning, and marketing and give businesses a more flexible, open, reliable, highly available and scalable environment. B2C businesses, in contrast, are product-driven and the ultimate goal of B2C business is to convert shoppers into buyers as aggressively and consistently as possible.

- *Variety of customer sizes, demands and requirements*

B2B products are usually more complex, requiring detailed product specification, product development which is technology driven, customer orientation focussed on organizational rather than individual needs. Orders vary from a few to many items, products range from small (e.g. industrial washer) to very large (e.g. giant commercial aircraft), demand is derived (i.e. demand for one good or service occurs as a result of demand for another) and there are closer buyer-seller relationships in B2B businesses.

The aforementioned characteristics signify that B2B and B2C businesses are different. Homburg and Fürst (2005:100) also support this view stating that 'business markets differ from consumer markets along several dimensions, leading to various degrees of effectiveness of marketing management approaches depending on the type of business (i.e., B2B or B2C)'. A report published by Visa Consulting (2007) further adds that in B2B, buyers make buying decisions based on increasing profitability, reducing costs

and enhancing productivity, whereas in B2C consumers make buying decisions based on status, security, comfort and quality. These differences between the B2B and B2C suggest that the customer requirement is very diverse in both businesses and thus, the relationship between operations performance and performance outcome is likely to vary greatly across both the businesses.

In their study in 2005 Mithas et al. show that the strategies for treating customers vary in the B2B and B2C firms. This is because the B2B firms are involved in infrequent purchases, as compared with small but frequent purchases in the B2C context, and also due to the presence of multiple stakeholders in the buying center in the B2B context, as compared with individual decision-making in the B2C context. Rauyruen and Miller (2007) point out that the B2B service providers need to understand the nature and the circumstances of their customers, as they act as organisations. Therefore, B2B service-providers should pay attention to the quality control of their service delivery systems and must put a lot of effort into creating high perceptions of the service quality. Rauyruen and Miller (2007) also reason that a high perception of service quality leads to increased customer loyalty. Keller and Aaker (1997) and Tang et al. (2008) also argue that perceived service quality is an important factor in the B2B. Bhappu and Schultze (2006), in their study of the B2B customers' adoption of self-service technology, found that in the B2B environment, both the relational and operational performance is of prime significance. These studies indicate that B2B businesses have different customer requirements from the B2C businesses.

The differences in the customers and the customer requirements of the B2B and B2C service firms may also affect the relationship between operations performance elements and performance outcome (customer satisfaction and customer loyalty). It would therefore be worthwhile to explore the service operations issues in both business environments. Providing empirical support to the findings of the linkages between operations performance and performance outcome will add to the existing literature on B2B and B2C services. The next section summarises and concludes this chapter.

## **2.4 Summary and conclusions**

This chapter reviewed the service economy literature and, in particular, the information sector, to highlight the growing significance of the information sector in the present

global economic scenario. The chapter identifies the IHIP characteristics of services and discusses some unique properties of the services which differentiate them from goods. The criticisms associated with the IHIP characteristics were also discussed in detail. Detailed classification schemes for the services were discussed and the two major classifications; service as an experience and service as process, were discussed in brief. This chapter also examined the rapid growth in the information sector and its growing contribution to Gross Domestic Product (GDP)/GNP. An analysis of the separation of information services from material-based services was also presented. The primary objective of this classification was to highlight that information services are distinct and cannot be handled in the same way, as material-based services. Finally, the chapter acknowledged that the information-service sector has greater market share and employment opportunities, and there is a recognizable need to explore this sector. The chapter also highlighted the differences between the B2B and B2C businesses and urges further investigation of the service operation issues in both B2B and B2C business environment.

This chapter provided a brief overview of the service economy and, in particular, the information economy literature. The literature showed that services are different from manufacturing goods and thus need to be treated in a different manner. The different classification schemes showed the breadth and complexity of the service domain. Despite the growth in this sector, research over the past years has focused mostly on addressing the manufacturing issues, with the service issues given much less attention. Some researchers, over the years, attempted to address the service operations issues in different information service firms, such as banking, telecommunications, and in healthcare organisations. The literature showed that the information sector has seen growth in the last decade or more and is the central emphasis of this research since few researchers have attempted to explore this sector. The lack of research in the information-service sector leaves an opportunity to test theories and models in the information service sector regarding service quality and service operations management. This has inspired me, in my PhD research, to explore the information sector and add to the existing literature. The distinct nature of the B2B and B2C businesses demands an exploration of service operations management issues in both branches of business. The next chapter provides a brief overview of the service operations management literature and identifies the research questions to be investigated in this research.

# **Chapter 3**

## **Service Operations Management**



### **3.0 Introduction**

This chapter provides an overview of the service operations management literature. The chapter highlights the growing significance of services in the modern economy and outlines the history of service operations since the early 20th century to the present day. Additionally, this chapter identifies operations performance indicators for services and focuses mainly on three operational indicators; quality, dependability and speed, the main areas of concern in information-service settings. The central focus of this thesis is to investigate the links between these operational performance indicators and customer satisfaction in information-intensive service firms. This chapter therefore explores these linkages in the relevant literature. It concludes by indentifying the research gaps in the literature, outlining the key findings and finally proposing the research questions that are being investigated in this PhD research. The objectives of this chapter are threefold:

- To identify the operations performance indicators in information-service settings
- To explore the operations performance and performance outcome links in the literature
- To identify the research gaps and pose research questions to be investigated in this thesis

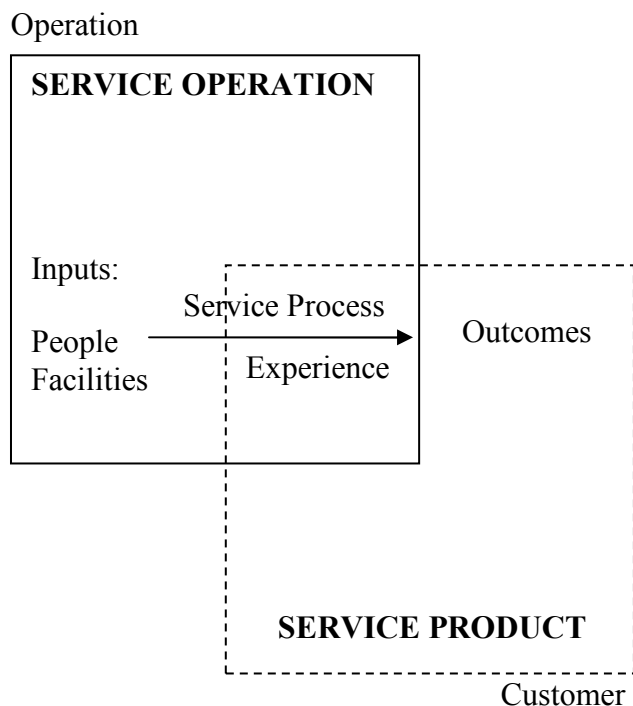
Section 3.1 starts with a discussion of service operations management and highlights the contribution of services in the global economy. Section 3.1.1 describes the history of service operation over a 100-year period and explores the stages in service operations' evolution. Two important components of the service operations management model, service experience and service outcome, are examined in sections 3.1.2 and 3.1.3 respectively. Section 3.2 identifies the operations performance indicators frequently used in service settings. Section 3.2.1 considers the link between operational indicators and customer satisfaction and customer loyalty. The service concept model is discussed in Section 3.2.2. Sections 3.2.3 and 3.2.4 elaborate on the Service Profit Chain (SPC) framework, and section 3.2.5 discusses the Return on Quality (ROQ) framework. The limitations of SPC framework are presented in Section 3.2.6. Section 3.3 provides a discussion of the chapter and concludes in Section 3.4 by identifying the research gaps and posing the necessary research questions.

### **3.1 Overview of Service Operations Management Literature**

Service Operations Management has attracted the attention of researchers and practitioners as a result of the worldwide and growing dominance of services. The rapid growth of services in the world economy is evident from a recent report published in The World Factbook (2010), shows the emergent supremacy of services as compared with industrial and agricultural products, in terms of their contribution to national Gross Domestic Product (GDP). Traditionally, operations management is associated with manufacturing industries and relies on a simple input-process-output model. However, the growing significance of the service economy has changed the operations management focus to incorporate service systems. Services grabbed the attention of operations management academics in the 1980s (Johnston, 1999). This, in turn, has led to the emergence of the 'Service Operations Management' concept which Johnston and Clark (2001) define as 'an activity that is concerned with both what service we deliver and how it is delivered to our customers'. Thus, service operations management deals with understanding the customer's needs and manages processes efficiently to deliver services on time and cost effectively, whilst simultaneously aiming to provide an excellent customer experience.

Operations management is generally product and operation centric. Service operations management, on the other hand, views services from customer and operational perspectives. As stated earlier, manufacturing based operations management relies on a simple input-process-output model where raw materials are processed to give the final tangible product. Although service operations management follows the same simple input-process-output model, it differs from the manufacturing sector, in that, instead of raw materials, the customers themselves are usually processed (Sampson, 2001). Moreover, production and consumption occur simultaneously and the service product is often a mix of tangible and intangible elements. For example, during the treatment of an illness, the patient actively participates in the treatment process together with the doctor to identify the cause and the possible remedy. The medical tests and reports are the tangible outputs of the treatment process, but, at the same time the patient's service experience and formation of a relationship with the doctor are intangible outcomes. Additionally, the involvement of the patient as a customer in the treatment process shows the simultaneity of production and consumption. As a result, service operations management issues involve a high degree of complexity. The simultaneity feature of

services has been challenged, as, nowadays some manufacturing goods also involve customer's participation in the early stages of production, such as customized PCs and automobiles. Silvestro et al. (1992) report that measurement of services is not straightforward as in manufacturing products, since significant volume increases can be made, irrespective of changes in the service process. Additionally, they point out that the volume of operations can be raised significantly by reproducing service operations. Nie and Kellogg (1999) argue that techniques and methods commonly used in manufacturing are often inadequate and restrictive when applied to service operations.



**Figure 3.1: Service Operation Model (Customer and Operational Perspective)  
(Source: Johnston and Clark, 2001:8)**

Johnston and Clark (2001) present a service operation model (input-process-output) (Figure 3.1) and emphasise the importance of managing customers properly. The figure shows two overlapping perspectives, i.e. customer operations which consist of service experience and service processes. Therefore, service operations involve managing both customer experience and outcome. Service experience is a critical aspect of a service operation, as it determines the customer's overall perception of the service. Service experience is also an important factor affecting the customer's judgement of the quality of the service. Originally Chase (1978), and later Johnston and Clark (2001), suggested that the service process consists of two components, namely front office and back office. The front office acts as an interface between the organisation and its customers, whereas the back office acts remotely from customers.

The front office processes customers: therefore, the customer experiences this part directly, and thus, the service experience aspect is very important. In contrast, the back office involves very little direct customer processing. Thus, in this case, service outcome becomes a vital factor in determining the customer's perception of the service. Realizing the significance of service operations management and the customer's importance in the overall service experience, it is worthwhile exploring the links between the operational factors and their impact on performance outcome, namely customer satisfaction and customer loyalty. The following sections will briefly highlight the history and stages of service operations management.

### **3.1.1 History and Stages of Service Operations Management**

The service operations management principles, as already stated, have gained the attention of researchers in the last few decades because of the growing significance of services in the world economy. The foundation of this research dates back to the early twentieth century starting with the application of scientific management to the service industries. Chase and Apte (2007) point out that Leffingwell (1917) was one of the first researchers to apply scientific management principles to service industries such as banking, insurance and mail order firms. Scientific management principles involve setting up routines, finding out the best way to plan them, and finally establishing a standard time for the performance of the chosen routine. Learning and remembering those routines were judged to be very important. Chase and Apte (2007) summarise the big research ideas in service operations from 1900 to 2000, as shown in Table 3.1. They outline the successful applications of service operations management through numerous examples, from the Walt Disney Corporations to McDonald's production line approach.

Roth and Menor (2003) highlighted that technological progress in the Internet and Communication Technologies (ICTs) has accelerated the pace of change in the service arena. The unprecedented growth in services motivated researchers to move from the traditional, product-centric operations management principles to more focussed service-oriented service operations management principles. The rapid growth in ICTs has resulted in an equivalent growth in the information sector. The growing interest of researchers in service operations in the past few decades is evident from the work of Marketing and Service Quality researchers such as Parasuraman et al. (1985), Zeithaml et al. (1990), Grönroos, (1994), Johnston (1999), Nie and Kellogg (1999) and Johnston

(2005) to name a few. Johnston (2005) suggested some of the key areas that needed research attention in the area of service operations management, such as performance measurement, operations improvement and linking operational performance to business drivers. Recently, Chase and Apte (2007) identified managing operations in information intensive services and using behavioural science to improve the customer experience, as some of the potentially important areas for research in service operations. Apte and Nath (2007), Lovelock and Wirtz (2007) and Karmarkar and Apte (2007) are some researchers who highlighted the growing significance of the information services sector and identified the lack of research addressing the service operations issues in this context. These findings indicate that research aiming to explore the links between operations performance and performance outcome, especially in the context of information intensive services, is still needed.

**Table 3.1: History of research in Service Operations  
(Source: Chase and Apte, 2007)**

Time Period	Theory and Practice Focus on
1900-1950s	Application of scientific management to services Walt Disney: Industrialized fantasy
1960s	Holiday Inns: consistency in multi-site services McDonald's: production-line approach to services
1970s	Service economy and operations in health care Industrialization of services Match supply and demand in services The customer contact model Data envelopment analysis
1980s	Classify services to gain marketing and operational insights Gap model of service quality and SERVQUAL Strategic service vision Unconditional service guarantee Psychology of queues Yield management
1990s	Service Profit Chain Using poka-yoke, or fail-safe, methods to prevent human errors in service system Globalization of information intensive services
2000s	Emergence of experience economy Using behavioural science in service operations Managing operations in information intensive services Information technology in services and e-services Global business process outsourcing Service Design

Johnston (1999; 2005) points out that service operation evolved through three stages prior to the 1980s to the late 1990s and questions the possibility of a fourth stage. Prior

to the 1980s, goods-oriented industries dominated the economy and general operations management principles were widely employed in industries to handle issues such as planning, scheduling, batching process, and marketing. This first period of evolution was called service awakening and, in this stage, the research was primarily descriptive and focussed on differentiating goods from services. During this service awakening period, progress in service operation was a little slower and was understood as operations research applied to service settings (Chase, 1996). Stage two (1980-1985) of service operations development was known as breaking free from product-based roots. This stage focused on developing a conceptual framework where services and goods are different. The researchers were interested in classifying the nature of services and service operations, such as customer-contact time and the degree of customisation.

Stage three (1985-1995), known as the service management era, focuses on the cross-disciplinary nature of the service research. In this era, researchers were more interested in empirical research and developing and testing frameworks. Johnston (1999; 2005) further raised the possibility of a Stage four (post 1995) of the service operations and terms this stage as 'return to roots'. This final stage of development focuses on applied research and emphasizes linking operations drivers to outcomes. This stage has generated much curiosity among service operations researchers such as Rust and Oliver (1994), Voss and Johnston (1995), Heskett et al. (1997) and Roth et al. (1997b) who have been undertaking empirical work to understand the links between operations drivers and performance outcomes for instance quality, staff satisfaction, profit and customer satisfaction. Table 3.2 summaries these four stages, adapted from the work of Johnston (1999; 2005). The previous section emphasized the customer as an integral part of the service experience therefore the next section examines this issue in detail.

### **3.1.2 Service Experience**

The growing interest of researchers in service operations management is apparent from these statistics. Since this PhD research deals with issues such as customer satisfaction and customer loyalty, which is viewed as an outcome of the service experience (Bloemer, Ruyter and Wetzels, 1999; Stank et al., 1999 and Shankara et al., 2003), it is helpful to look in detail into this aspect of service operations. While the service experience is the customers' overall experience of the service, this has a major influence on their future relationship with the service provider. Innis and La Londe (1994) support

this opinion by acknowledging customer service as the key to customer satisfaction and customer loyalty. Additionally, Bloemer, Ruyter and Wetzels (1999) and Shankara et al. (2003) specify that a good service experience delivers high satisfaction.

**Table 3.2: Stages of Service Operations Management Development**  
(Source: Johnston 1999:113)

STAGE	NATURE OF RESEARCH	FOCUS OF RESEARCH	OUTCOMES	OPERATIONS MANAGEMENT ISSUES	RELATIONSHIP BETWEEN FUNCTIONS
ONE	Descriptive	Goods vs. services	Services are different	Growing awareness of the importance of service, customer operations and customer contact	
TWO	Conceptual	Characteristics of services and service management	Conceptual frameworks	Challenge to existing operations paradigms and the development of "customer operations"	
THREE	Empirical	Development and testing of frameworks	Large amount of service material based on new cross-functionally derived models	Development of service processes, quality, failure, design and technology with a view that service could contribute to manufacturing	
FOUR	Applied	Prescription	Linking operations drivers to outcomes	The return to roots-the need to re-focus service operations towards traditional operational issues and approaches	

Service operation is divided into two parts: customer contact and operations, as shown in the service operations model discussed earlier (Johnston and Clark, 2001). Tseng et al. (1999) demonstrate that, in the service operations system, customers actively participate to add value to the service and this active participation of customers is a characteristic unique to service operations. This notion was also endorsed in Sampson's (2001) proposed 'Unified Service Theory', whereby the customer acts as an essential element in the production process in services. The involvement of customers in the production process makes service operations more complex than the normal production of goods. Nie and Kellogg (1999) also argue that the presence of customers in the service system makes it complex and they conclude that customer influence, encapsulated by customer contact, customer interaction, customer encounters, customer participation and customer involvement, reflect the impact of the customer on the service operation. In service operations, inputs such as goods, people or facilities go through the service process and result in outcomes i.e. service product. Johnston and Clark (2001) define the service experience as the customer's direct experience of the service process and concerns the way in which the customer is treated by the service provider. The service experience, therefore, encapsulates the customer and staff experience, as well as the customer's experience with the service organisation and its facilities (Johnston and Clark, 2001).

The success of service firms depends on customer satisfaction and that is driven by the customer's experience with the service, as highlighted in the Service Profit Chain framework (Heskett et al., 1994). For that reason, service operation plays a key role in maintaining the service experience. Customers go through the service experience during the service process phase of service operations. Different researchers have attempted to explore the service experience and process concept in their own ways. Some of these attempts of the researchers are listed below;

- Tseng et al. (1999) divides the customer contact area part of the service operations into two parts: the inanimate environment and the service personnel. They show that service value is achieved by the contact between the customer and the service personnel, in the service environment. They define this whole customer experience as the service experience.



- Nie and Kellogg (1995) categorize the service process into three types. First, the expert service process which involves a high degree of customer contact. Therefore, the customer, in conjunction with an expert staff, creates service value. Secondly, the service shop process that involves a medium level of customer influence closely resembles the manufacturing job shop. And thirdly the service factory with a low level of customer contact.
  
- A number of researchers argue that a poor service experience may result in low customer satisfaction whereas a good service experience results in increased customer satisfaction and improved performance by the firm (Shostack, 1984; Horovitz, 1990; Sulek et al., 1995; Gummesson, 1998; Tseng et al., 1999). Since a customer's judgement of quality is based on the service experience, the outcome therefore, for a good service experience, the customer-employee interaction is crucial.
  
- Johnston and Clark (2001:8) pin down the different aspects of the service experience as;
  - The extent of personalisation of the process
  - The responsiveness of the service organisation
  - The flexibility of customer-facing staff
  - Customer intimacy
  - The ease of access to service personnel or information system
  - The extent to which the customer feels valued by the organisation
  - The courtesy and competence of customer-facing staff

The arguments presented in the above paragraphs clarify the concept of service experience and emphasize the need for a good service experience for increased customer satisfaction and profitability. Therefore, a service operations manager must value the customer experience and focus on improving the customer-employee interaction to generate a positive service experience. The next section will examine the third dimension of the service operation i.e. service product.

### **3.1.3 Service Product/Service Outcome**

It is often stated that characteristic of services is simultaneity i.e. production and consumption occur simultaneously. Thus, it is very difficult to differentiate outcome of service from the service experience. There are fair possibilities of overlap between the outcome and the experience (Johnston and Clark, 2001). Sink (1985:25) traditionally defines output as any controllable factor or resource that results from a transformation of the input. Service outcome, however, is the result of the service process and service experience. So, the evaluation of the service outcome is dependent on both factors and is likely to change with the customer's experience of one component. For example, Johnston and Clark (2001:8) argue that, when customer expectation about either the service process or the service experience exceeds customer's expectation, it is very likely to result in a better evaluation of the service outcome.

Ojasalo (1999) argues that the outcome of the service production process is usually a mixture of tangible and intangible items (legal services, business consulting). Defining and measuring service outcome is consequently difficult (Lovelock, 1991). For example, the productivity of the educational system is linked to the evaluation of the quality of students shaped in relation to the purpose of their learning, while the outcome of the educational systems often tends to be measured by the number of students. Ojasalo (1999; 60) further asserts that 'it is often unclear what represents 'one unit' of service produced and it is also difficult to measure the amount of input resources needed for the production of that unit of service'.

The judgement of the quality of service relies on both the service experience and service outcome. Therefore, service operations managers need to pay special attention to these factors to gain a competitive advantage over others. The success of the service process is judged by several operations-performance indicators. These are crucial for evaluating the customer's perception of the service and their further long-term relationship with the service firm. The next section will therefore deal with the operations performance indicators.

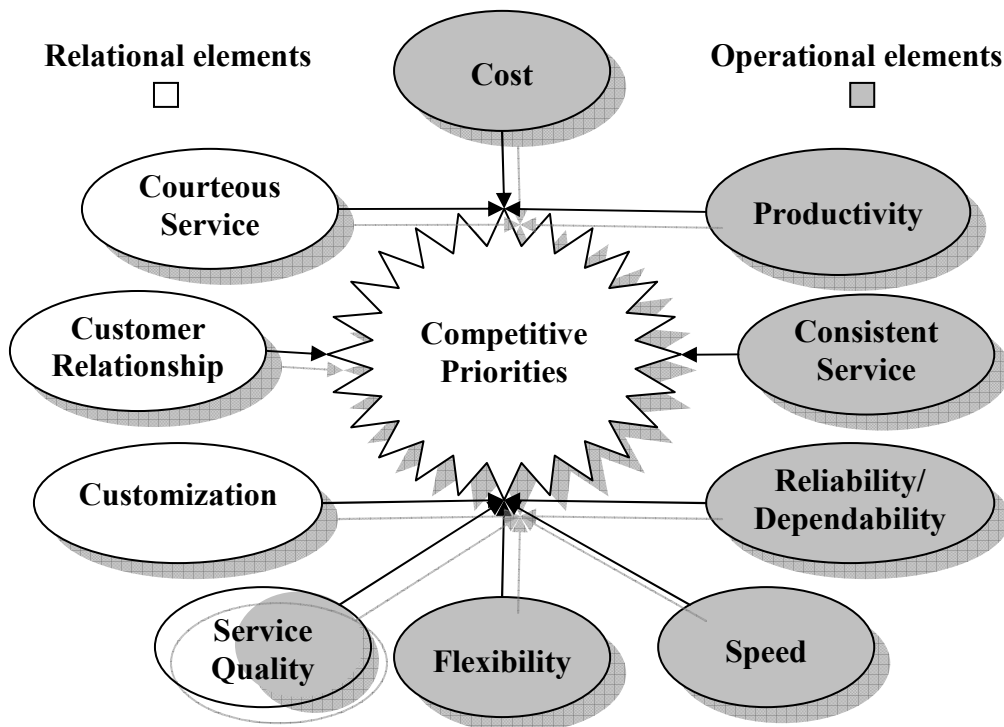
## 3.2 Operations Performance Indicators

Performance indicators are often known as competitive priorities such as quality, delivery speed, flexibility, or cost (Ward et al., 1998; Kathuria, 2000; Krause et al., 2001). The measures used to assess operations performance depend on the activities and kind of product offered by the service provider (Harris and Mongiello, 2001). Many researchers suggest several performance measurement systems or concepts such as the balance score card, strategic cost management, and critical success factor to assess the performance of services (Rockhart, 1979; Geller, 1984; Lynch and Cross, 1991; Fitzgerald et al., 1991; Kaplan and Norton, 1992; Shank and Govindarajan, 1993; Harris and Mongiello, 2001; Lange et al., 2007). The discussion of performance measurement systems is beyond the scope of this PhD research, which is focused mainly on identifying the operations performance indicators that are frequently addressed in the service operations literature.

The operations performance indicators for manufacturing firms are well established in operations management literature, which identifies cost, flexibility, quality, dependability, and speed as critical manufacturing competitive priorities (Vickery et al., 1997; Stank et al., 1999; Slack et al., 2004). Johnston (2005) identifies service quality and productivity as performance measures. Services productivity is by contrast difficult to measure because of the intangible factors in both input and output that are difficult to define in quantities (Armistead et al., 1988; Lovelock, 1991; Sumanth, 1997; Ojaslo, 1999). Stank et al. (1999) offer courteous service, consistent service and customer relationship as some of the competitive priorities. They further argue that courteous service and customer relationship are relational in nature, whereas consistent service is a measure of operational performance associated with reliability or dependability. This operations performance indicator was also considered in the SERVQUAL model developed by Parasuraman et al. (1985).

Subsequent studies based upon the SERVQUAL model have found that, of the five dimensions, reliability was the most important performance factor for customers (Zeithaml et al., 1990; Parasuraman, 1991; Berry, 1995). Reliability/dependability is the organisational ability to perform the promised service consistently and accurately (Slack, 2004). Dependability has also emerged as an operations element of prime importance in service quality studies (Zeithaml et al., 1990; Parasuraman, 1991; Berry,

1995). According to Stank et al. (1999), reliability/dependability is most closely associated with operations performance, as it is fundamentally concerned with the dependability and accuracy of the service. Barbacci et al. (1995) define dependability as the consistency of the service delivery. They report reliability as one of the several attributes of dependability, along with availability, safety, confidentiality, integrity and maintainability. However, one should not get confused with the term consistent service and reliable service. Consistent service refers to delivering the standard service again and again i.e. repetitive service to its customers so that the service level matches with their expectations. Reliable service refers to delivering efficient and trustworthy service to customers. These attributes have also been reported in the work of Littlewood and Strigini (1993); Laprie et al. (1992, 1995); and Avizienis et al. (2004).



**Figure 3.2: Service Performance Indicators**

Previous studies have provided some empirical support to the theory that dependability, quality and speed form the operational performance indicators (Bielen and Demoulin, 2007; Andreassen, 1999). Rosenzweig and Roth (2004) identify quality, dependability, flexibility, and cost as key competitive capabilities. Table 3.3 summarises the views of some researchers on service-operations performance measures. These studies suggest that the operations-performance indicators identified are widely debated in the services context. However, the quality and dependability indicators have been primarily discussed in SERVQUAL literature. Realizing the significance of quality and

dependability indicators in service quality and services operations management literature (Zeithaml et al., 1990; Parasuraman, 1991; Barbacci et al., 1995; Vickery et al., 1997; Andreassen, 1999; Johnston, 2005) this research focuses particularly on these two operations performance elements. Cost and flexibility were not included in this study since investigation of these two indicators was beyond the scope of this research. Figure 3.2 summarises the service performance indicators and highlights the operational and relational elements. The upcoming sections will examine the link between these operations-performance indicators and performance outcome, namely, customer satisfaction and customer loyalty. The Service Profit Chain (Heskett et al., 1994) provides a clear and widely accepted theoretical perspective in explaining the link between service quality, customer satisfaction and loyalty. This next section explores the Service Profit Chain (SPC) perspective in detail.

**Table 3.3: Summarized View of Researchers on Service Operations Performance Measures/ Competitive Priorities**

<b>Researchers</b>	<b>Performance Measures/Competitive Priorities</b>
Roth and Van der Velde (1991)	service quality, price, convenience, customization and customer relationship
Li and Lee (1994)	price, quality and delivery speed
Maskell (1991), White (1996)	quality, cost, delivery reliability, lead time, flexibility, and employee relationships
Vickery et al. (1997), Slack et al. (2004)	cost, flexibility, quality, dependability, delivery speed
Ward et al. (1998)	cost, quality, delivery time and flexibility
Chen (1999)	quality, dependability, cost, flexibility, innovation, service, and time
Kathuria, R., (2000)	price, quality, dependability, and flexibility
Roth and Menor (2003)	service quality, customer growth, altruism, productivity, business performance and cost
Vickery et al. (2003)	responsiveness to customers, delivery dependability, and delivery speed
Rosenzweig and Roth (2004)	conformance quality, delivery reliability, volume flexibility and low cost
Neely et al. (2005)	quality, time, flexibility, and cost
Johnston (2005)	service quality, price, dependability, flexibility, and productivity
Phusavat and Kanchana (2008)	quality, cost, delivery speed, flexibility and customer focus/dependability

### **3.2.1 Operations Performance, customer satisfaction and customer loyalty link**

The operational performance indicators, already well established in operations management literature, have been identified earlier in this chapter (consistent service, service quality, speed, flexibility, cost, and dependability). However, this thesis primarily deals with the three operations performance indicators quality, dependability and speed. In order to evaluate the success of a service product: the combination of service experience and service outcome, one need to understand the link between the operations-performance and the performance outcomes i.e. customer satisfaction and customer loyalty. Customer satisfaction is generally measured as a gap between the customer's expectations and actual perceived services (Grönroos, 1984; Anderson and Sullivan, 1993) whereas customer loyalty is defined as the customer's long-term commitment to repurchase and willingness to use the service repeatedly (Stank et al., 1999). Customer satisfaction should not be confused with service quality, as they are different constructs. Parasuraman et al. (1985) and Bitner and Hubbert (1994) describe the differences between these two as customer satisfaction being more specific, short term evaluation of service whereas service quality being a more general and long term evaluation . For example, a customer can experience a good service quality but still feel dissatisfied or he/she can be satisfied despite the poor service quality.

Anderson and Sullivan (1993), Jones and Sasser (1995) and many other marketing researchers have identified a strong link between customer satisfaction and customer loyalty, that was discussed in the Service Profit Chain (SPC) framework (Heskett et al., 1994). The fact that customer satisfaction is of fundamental importance and potentially offers a broad range of benefits for any organisation is well established in the literature. Previous studies reveal that a satisfied customer is more likely to repurchase, leading to increased sales and market share (Cronin and Morris, 1989; Innis and La Londe, 1994). Eggert and Ulaga (2002) point out that customer satisfaction is a strong predictor of behavioural variables, such as customer loyalty, word of mouth, and repurchase intentions. Parasuraman et al. (1988), Cronin (2000), Lin and Wang (2006), and others also report customer satisfaction as a prime determinant of customer loyalty. These studies indicate a strong link between the two performance-outcome measures; customer satisfaction and customer loyalty.

Several researchers have attempted to reveal the links between the operations performance indicators and performance outcomes, as evident from the work of Parasuraman et al. (1988); Bloemer et al. (1998); Cronin (2000); and Chiou and Dorge (2006). The service quality link with customer satisfaction and customer loyalty has been discussed frequently in the service quality and marketing literature (Grönroos 1984; Parasuraman et al. 1988, 1991; Berry et al., 1995; Cronin, 2000; Brady and Cronin, 2001; Chiou and Dorge, 2006; Gonzalez et al., 2007). Taylor and Baker (1994) reported that high service quality leads to increased customer satisfaction and higher purchase intentions. Bloemer et al. (1998) also point to the positive link between service quality and customer loyalty in their study of the banking sector. Brady and Robertson (2001) identify a causal relationship between service quality and customer satisfaction while studying the development of the behavioural intentions of service customers. They suggest that service practitioners should provide quality service as a means of improving satisfaction judgments.

Gonzalez et al. (2007) stress the positive relationship between perceived service quality and customer satisfaction. They found that perceived service quality is an antecedent of satisfaction. Chiou and Droge (2006), in their study, show that the attribute of satisfaction and interactive service quality generate overall satisfaction and trust. They studied a customer satisfaction and loyalty framework where the direct and indirect effects of service quality, trust, specific asset investment, and expertise were examined. These studies show a strong link between customer satisfaction and service quality. This relationship between service quality and customer satisfaction can be further understood through the service concept model (Goldstein et al. 2002). A service concept model provides an understanding of the nature of service and the relationship between the service provider and the customer. The service concept model will be detailed in the next section.

Another important operational indicator, dependability, is also the focus of this research. Its relationship to customer satisfaction and loyalty has also been addressed by several researchers, such as Parasuraman et al. (1991), Zhang et al. (2003), Sramek et al. (2008) and Lai and Yang (2009). Patterson and Marks (1992) signify that dependability promotes customer satisfaction. In his own study White (1996) discusses dependability as a performance factor that affects customer satisfaction. This view was also supported in the work of Lai and Yang (2009) who, in a recent finding, demonstrate that perceived

dependability affects user satisfaction positively. Rosenzweig and Roth (2004) also identify an interrelationship between dependability and quality, as they hypothesize that enhanced conformance to quality has a direct influence on improvements in reliable delivery. They further provide empirical evidence of their impact in driving business performance i.e. profitability. These findings from literature show that there has been some work identifying dependability as a key operational indicator (Patterson and Marks, 1992; Stank et al., 1999; Lai and Yang, 2009). However, there is a lack of empirical evidence in literature that addresses the link between dependability, customer satisfaction and customer loyalty in the information economy context.

The impact of delivery speed on customer satisfaction has also been studied by several researchers such as Weaver-Meyers and Stolt (1996), Vickery et al. (1997; 2003) and Phusavat and Kanchana (2008). These studies argue that the performing well on the delivery speed has a positive impact on the customer satisfaction. Holmström (1994, 1995) in his study of the relationship between the speed and the productivity also indicated a strong positive relationship between the speed and the efficiency. Stank et al. (1999) also points out that the operational elements such as delivery speed has a positive influence on customer satisfaction and the purchasing pattern. This notion was also supported by Matzler et al. (2003), Zhang et al. (2005), and others.

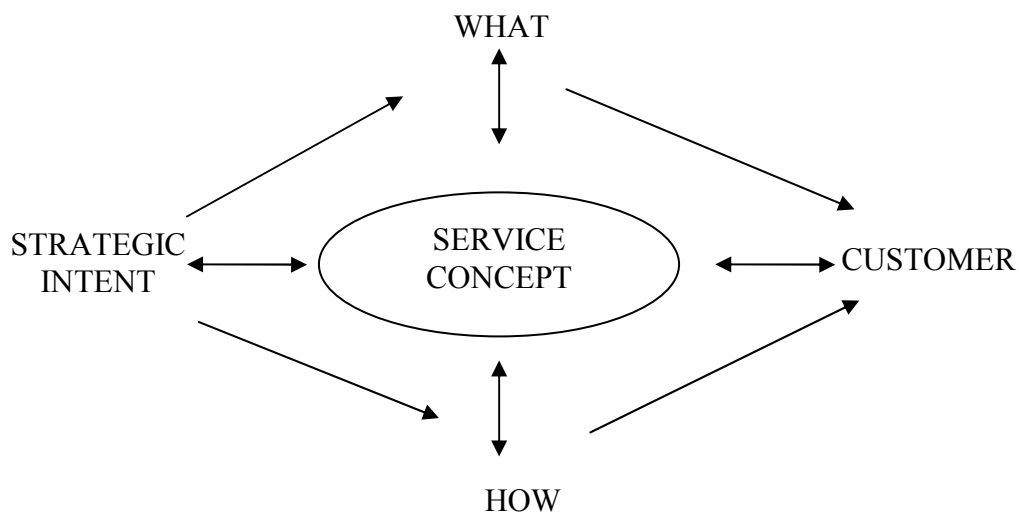
These studies highlight the impact of individual operational performance indicators on customer satisfaction and customer loyalty. The research, however, investigating the combined impact of operations performance indicators and performance outcome is scarce. Moreover, there is a lack of research which attempts to explore the interrelationship among the operational performance indicators. And thus, too, this needs to be investigated. The literature that addresses the information economy context deals primarily with three operations performance indicators, quality, dependability and delivery speed. This is evidenced in the service operations literature (Juran, 1981 (a, b); Moutinho and Brownlie, 1989; Schlesinger and Heskett, 1991; Bloemer et al., 1998; Stank et al., 1999; Avizienis et al., 2004; Lai and Yang, 2009). This has motivated this research to focus specifically on operational performance indicators, quality dependability and speed. As pointed out earlier, most the studies fail to indentify the interrelationship among the operational indicators and, as few researchers have attempted to explore this issue, their works are mostly in the manufacturing context (Ferdows and De Meyer, 1990; Roth and Giffi, 1995; Rosenzweig and Roth, 2004).



This thesis attempts to fill this research gap by studying the interrelationship between the operational performance indicators (quality, dependability and speed) and their further impact on customer satisfaction in the context of information service settings. The next section intends to concentrate on the service concept model that is the customer's and the service provider's perception of the services.

### 3.2.2 Service Concept

An understanding of the customers' perception of the services is essential from the service quality perspective, as meeting customer expectations leads to customer satisfaction. The 'service concept model' has emerged as a result of the curiosity of service researchers to understand the perception of services from the customer and service provider's viewpoint. This model provides a way of understanding the nature of the service and further helps service firms to improve their relationship with customers, by having a better understanding of their expectations.



**Figure 3.3: The Service Concept Model**  
(Source: Goldstein et al. 2002)

Various researchers have attempted to define the service concept in different ways (Heskett, 1986, Collier, 1994, Edvardsson and Olsson, 1996, Goldstein et al., 2002). Heskett (1986) defines the service concept as the way a service provider likes to get its services perceived by customers, employees, shareholders and lenders. Edvardsson and Olsson (1996) highlight the importance of the service concept at the service design and development stage, and point out that the service concept entails an understanding of why the firm must identify the needs of its customers and how the firm should plan its strategy to meet these requirements. Edvardsson et al. (2000) further define the service

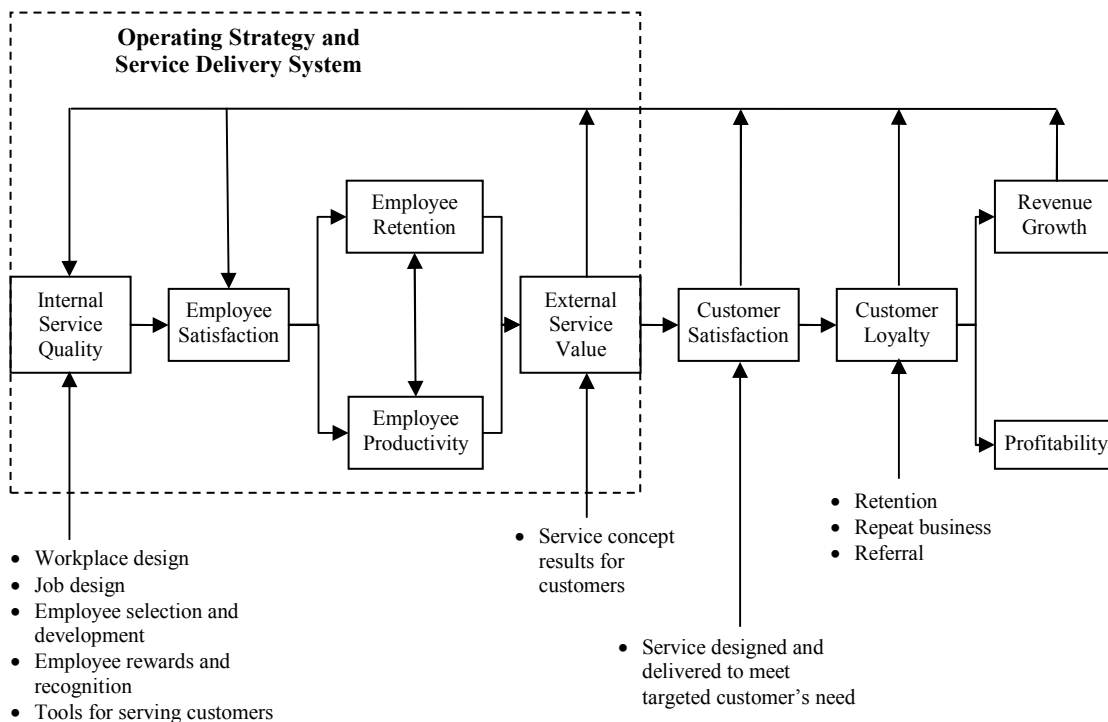
concept as detailed analysis of the means of identifying customer needs and how the service firm should fulfil their customers' satisfaction level. Johnston and Clark (2001), however, define the service concept as an integration of the service operations concept, service experience, service outcome, and service value.

Goldstein et al. (2002) proposed a service concept model as shown in the Figure 3.3. The figure shows the four dimensions over which the model has been constructed. Goldstein et al. (2002) argue that the lack of understating of customer needs, and a poor strategy to counter customer expectations, results in a poorly perceived service. Therefore, the service concept model provides an understanding of the complex relationship between what a customer wants and how the firm should plan its strategy. Goldstein et al. (2002), referring to the work of Clark et al. (2000), also point out that the service concept helps to reduce the gap between expectations and service delivery. Therefore, the service concept model not only highlights the key relationships between the customer and the service provider, it also helps in designing and planning services to address customers' needs. Thus, the model also identifies the importance of the link between service quality and customer satisfaction. The discussion of the service concept model here provides a theoretical understanding of the relationship between the customers and the service providers. The Service Profit Chain (Heskett et al., 1994) provides a clear and widely accepted theoretical perspective in explaining the link between service quality, customer satisfaction and loyalty. The next section explores in detail the Service Profit Chain (SPC) perspective.

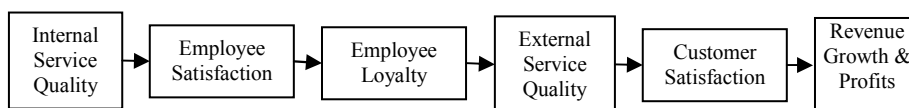
### **3.2.3 Service Profit Chain**

The Service Profit Chain, first proposed by Heskett et al. (1994), establishes a relationship between service quality, employee satisfaction, customer satisfaction, customer loyalty and profitability. Kamakura et al. (2002) states that 'Service Profit Chain (SPC) provides an integrative framework for understanding how a firm's operational investments into service operations are related to customer perceptions and behaviours, and how these translate into profits'. Figure 3.4 shows the Service Profit Chain model originally proposed by Heskett (1994). Based on the elements of the system shown in the Figure 3.4, the Service Profit Chain rests on seven propositions, presented here in Table 3.4. Several studies have supported the Service Profit Chain model and the model's propositions (Metters and Vargas, 2000; Stanley and Wisner,

2001; Hill et al., 2002; Zeithaml and Bitner, 2003; Schneider et al., 2005; Voss et al., 2005; Brown and Hyer, 2007). The examination of these propositions will highlight the linkages between the different operations performance elements and performance outcomes. However, this research is primarily focuses on service quality, customer satisfaction and loyalty linkages of the SPC framework. The next section briefly identifies and discusses the propositions of the service profit chain framework.



**Figure 3.4: Service Profit Chain Framework (Source: Heskett et al. 1994)**



**Figure 3.5: The Service Profit Chain (Source: Voss et al., 2005)**

### 3.2.4 Service Profit Chain Framework

For more than a decade, the service profit chain has been through many modifications by researchers such as Vilares and Coelho (2003); Gelade and Young (2005); and Voss et al. (2005). Researchers' have predominantly been interested in exploring the isolated links of the service profit chain framework rather than a comprehensive exploration. Although the propositions of the Service Profit Chain have not changed over the years, the structure of the framework has been simplified. Voss et al. (2005) presents a

simplified version of the Heskett's original Service Profit Chain framework (Figure 3.5). The components of the service profit chain framework are discussed below:

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**Table 3.4: Service Profit Chain Propositions(Source: Brown and Hyer, 2007)**

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- P1. Internal service quality drives employee satisfaction
  - P2. Employee satisfaction drives loyalty
  - P3. Employee loyalty drives productivity
  - P4. Employee productivity drives external service value
  - P5. External service value drives customer satisfaction
  - P6. Customer satisfaction drives customer loyalty
  - P7. Customer loyalty drives revenue growth and profitability
- 

### **Internal Service Quality**

Heskett et al. (1994) point out that internal service quality is about equipping employees with the skills and power to serve customers. In service profit chain framework the internal service quality leads to employee satisfaction. Schneider and Bowen (1993) add to this by showing there is a positive relationship between employee satisfaction and internal service quality. Their study indicates that employee experiences are transmitted to consumers during the service encounter. Edvardsson et al. (1997) further highlight the significance of internal service quality in managing the customer's experience of service quality. They identify internal service quality as significant in attaining overall service quality, as it affects the employees experiences positively.

### **Employee Satisfaction**

Employee satisfaction and its link to customer satisfaction and loyalty have been explored by many researchers. Parasuraman, Zeithaml and Berry (1985) distinguish the significance of staff satisfaction and service quality as drivers of customer satisfaction. Ryan et al. (1996), Loveman (1998) and Koys (2001) also demonstrate a positive correlation between employee satisfaction and customer satisfaction. Heskett et al. (1997) conceptualized a strong positive relationship between customer satisfaction and the staff's job satisfaction within the service environment, which they often described as "satisfaction mirror".

## **Employee Productivity**

In services, productivity is measured based on the revenue generated by an employee divided by his/her salary. Service Profit Chain emphasizes that employee productivity drives service value. Brown and Hyer (2007), in their investigation of the Harvey System, point out that trained employees were very efficient and quick in handling customer load and hence the low turnaround time was significantly helpful in generating service value. Heskett et al. (1994) highlighted this relationship through a study of Southwest Airlines. Their findings indicate that higher values, delivered by their employees, make Southwest Airlines a profitable organisation. Harter et al. (2002) and Brown and Hyer (2007) also stress the link between employee satisfaction, productivity and profitability.

## **External Service Quality**

The service quality link with customer satisfaction and customer loyalty has been examined in the service quality literature. Appendix A highlights the work of some of the key researchers on the application of SERVQUAL in the service settings. While some researchers have reported that customer satisfaction exerts a stronger influence on purchase intentions than service quality (Cronin and Taylor, 1992), others provide strong empirical evidence supporting the view that service quality increases a customer's intentions to remain with a company. For instance, Buzzell and Gale (1987) have found that service quality results in repeated sales and increased market share, which stem from customer loyalty. Research by Zeithaml and Bitner (1996) concluded that, when organisations enhance the quality of their services, customers' favourable behavioural intentions are increased while unfavourable intentions are simultaneously decreased. Anderson and Sullivan (1993) and Boulding et al. (1993) also studied the impact of service quality on repurchase intentions. Roth and Jackson (1995) identified the determinants of service quality and performance in the banking industry.

## **Customer Satisfaction**

The marketing and service science literature sees customer satisfaction as one of the prime determinants of customer loyalty (Parasuraman et al., 1988; Anderson and Sullivan, 1993; Andreassen and Lindestad, 1998; Cronin, 2000; McDougall and

Levesque, 2000; Chiou et al., 2002; Lin and Wang, 2006). Customer satisfaction is a customer's overall judgement regarding the extent to which a product or service performance matches expectations (Anderson and Sullivan, 1993). It is considered a strong predictor of behavioural variables, such as customer loyalty, word of mouth, and re-purchases intentions (Eggert and Ulaga, 2002). Many researchers, as well as the service profit chain literature, have reported on a positive correlation between customer satisfaction, customer retention and customer loyalty which ultimately leads to profitability (Heskett et al., 1994; Parasuraman et al., 1988; Anderson and Sullivan, 1993; Hallowell, 1996; Mittal and Kamakura, 2001).

### **Customer Loyalty**

As customer acquisition is an expensive and difficult task for companies, requiring considerable investment, time and effort, customer retention has become a major concern for organisations, which focus increasingly on strategically building a strong base of loyal customers rather than attracting new ones. Indeed, it has been found that retaining customers is more profitable than investing huge sums in attracting new ones (Ennew, 2003; Weinstein, 2002). As a matter of fact, customer retention is an inherent outcome of customer loyalty, which has been positively linked to financial performance indicators such as profitability and market share (Anderson et al., 1994). This aspect is reinforced by Reichheld and Sasser (1990), whose study has shown that enhanced customer loyalty results in increased revenue and market share, reduced customer acquisition costs, and overall profitability. Rust and Zahorik (1993) have also reported a sequential linkage between customer satisfaction, loyalty and market share. Ralston (1996) also further strengthens this finding by showing that there is a direct relationship between satisfaction and the likelihood of continuing the same service, i.e. loyalty.

### **Profitability and Revenue Growth**

The final proposition links customer loyalty to profitability and revenue growth. As Heskett et al. (1994) point out 'customer often becomes profitable over time.' This statement suggests a strong link between these two constructs. Hallowell (1996) also accepts the relationship between loyalty and profitability. The study tests the link between customer satisfaction, customer loyalty and profitability and reports that customer satisfaction is significant in achieving higher profitability. Research conducted

by Anderson and Mittal (2000) shows that a 1% increase in customer satisfaction results in a 2.37% increase in investment return. Recently, Brown and Hyer (2007), in their study of the Harvey System, found that customer retention results in substantial increase in revenues.

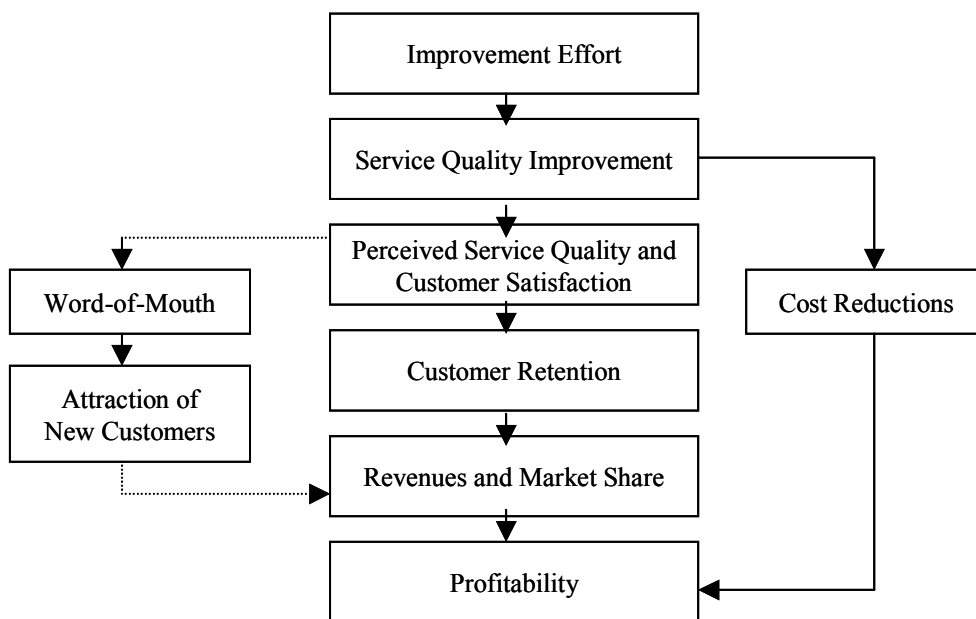
These research findings indicate that service profit chain links have been widely investigated by researchers, although in a fragmented manner rather than comprehensively. There is a need therefore to investigate comprehensively the service profit chain framework and thus provide supporting empirical evidence. An understanding of the Service Profit Chain provides the theoretical foundation for this study. In my research the link between quality, dependability and customer satisfaction has been empirically investigated. The next section signals the limitation of the Service Profit Chain Framework.

### **3.2.5 Limitations of research in Service Profit Chain**

The Service Profit Chain (SPC) provides an integrated model, where all the elements are interconnected, starting from internal service quality through employee satisfaction, employee loyalty, external service quality, customer satisfaction, customer loyalty and leading to profitability and growth. There is however a lack of empirical evidence assembling all the propositions, as outlined by researchers such as Soteriou and Zenios, (1999); Kamakura et al., (2002); and Anderson et al., (2004). Soteriou and Zenios (1999) show that most of the studies have looked at the individual links of the SPC framework, but none have studied the Service Profit Chain comprehensively. This was also evidenced in the work of Silvestro and Cross (2000), where the lack of empirical support for the Service Profit Chain model was highlighted. Since this study is focussed on understanding the link between quality, dependability, customer satisfaction and loyalty therefore, only three elements of the SPC framework (quality, customer satisfaction and customer loyalty) were of more interest.

Kamakura et al. (2002) further identify some gaps that result from the lack of comprehensive modelling of the Service Profit Chain by researchers. They insist that studies attempting to test the links separately fail to identify causal and mediating mechanisms and thus, do not give managers a clear understanding of how to implement the Service Profit Chain framework. Furthermore, the individual studies result in

inconsistent findings and thus restrict the applicability of the framework among firms. As Kamakura et al. (2002) suggest ‘despite strong support for isolated links, a comprehensive “big picture” approach is needed at the firm level to provide management with action priorities’. This research studies the quality, dependability and customer satisfaction and loyalty links thus investigating the three elements of the SPC framework (quality, customer satisfaction and loyalty). So this study will explore the causality among the three elements of the SPC framework. The next section discusses the ‘Return on Quality’ framework.



**Figure 3.6: Return on Quality Framework (ROQ) (Rust et al., 1995:60)**

### 3.2.6 Return on Quality

In order to understand the links between service quality, customer satisfaction and customer loyalty a complementary study of ‘Return on Quality’ model was also carried out. The ‘Return on Quality’ framework (Rust et al., 1995) shows the link between the financial performance and key services attributes involving service quality, customer satisfaction and customer retention (Figure 3.6). The ROQ framework differs from the Service Profit Chain in that it focuses mainly on profitability rather than on profitability and revenue growth together. The ROQ framework rests on the assumptions that quality is an investment and that it must be financially accountable; there is a tendency to spend too much on quality when all quality expenditures are not equally valid (Rust et al. 1995:59). However, the ROQ framework poses few difficulties by its adoption in many firms. Rust et al. (1995) point out that several ROQ practical issues need to be



considered by the firms before adopting this model, such as the modification of customer satisfaction questionnaires, conversion of the existing satisfaction scales and the market segmentation. This limitation gave the SPC framework an edge over the adaptation issues. Nevertheless, both frameworks show that service quality is a strong predictor of customer satisfaction, which further drives profitability. Perceived value is also considered as a determinant of customer loyalty (Parasuraman et al., 1988; Costabile, 2000; Lam et al., 2004). Simply expressed, perceived value is the ratio of perceived benefits to perceived costs (Zeithaml, 1988). Customers develop loyalty towards a particular firm when they feel that they are receiving greater value, as compared with its competitor (Bitner and Hubbert, 1994; Sirdeshmukh, et al., 2002). A study by Lam et al. (2004) showed that customer value correlates positively with customer satisfaction and customer loyalty. The next section takes some of the key findings and proposes some research questions.

### **3.3 Research Questions**

The performance of service firms affects customer satisfaction and customer loyalty to a great extent. According to Reichheld and Sasser (1990) those firms that value customer closeness are able to provide higher levels of service effectiveness. Juran (1981 a, b) argues that any firm that aspires to higher quality levels must become proactive to its customers, must be able to anticipate their expectations and measure the extent to which they have satisfied their customers' needs. Schlesinger and Heskett (1991) conclude that successful service firms are those firms who understand their customers' needs and expectations and have the ability to provide quality services to meet them in an efficient manner. These discussions highlight the emergence of two critical dimensions of service performance: performance relative to operational elements and performance relative to relational elements (Stank et al., 1999).

Collier (1991) describes service performance as comprising two distinct dimensions: an operations-oriented and a marketing-oriented dimension. This research primarily focuses on the operational element (dependability and quality) of the service performance and its links with customer satisfaction. An attempt will also be made to investigate the links between operations performance elements (dependability, quality and speed) and customer loyalty. As pointed out in the previous chapter on information services, this research is aiming to investigate the service operations issues in B2B and

B2C information service firms. This leads to the first research question of this thesis, i.e.

*RQ1: What is the link between dependability, quality, and customer satisfaction in B2B and B2C information service firms?*

Although specific operational processes have particular objectives, they are all components or elements of the same service system. The literature review has already clarified the importance and the need for further exploration of the link between operations performance and satisfaction. Additionally, the review further concluded that there has been substantial research concerning the impact of individual operational performance indicators on customer satisfaction. But that research investigating the links that consider more than one operations performance indicator is scarce. Considering the systemic interaction, this is a very important issue, given that exploring the individual links is not sufficient for an understanding of the whole. Since, at any time, more than one operational performance indicator affects customer satisfaction or customer loyalty therefore, the understanding of the interrelationship among the different operations performance indicators is essential for a better understanding of the service system. Realizing the significance of the interrelationship among the operations performance elements, investigating their combined impact on performance outcomes is beneficial. This leads to the second question posed for research in this thesis,

*RQ 2a: What is the interrelationship between operations performance indicators?*

*RQ 2b: Does this interrelationship affect customer satisfaction?*

A great deal of the published research focuses on the relationship between the two dimensions of service quality (i.e. technical and functional) and satisfaction. Some researchers have termed these two quality aspects either as ‘core’ and ‘relational’ (Levesque and McDougall, 1996; Jamal and Naser, 2003) or ‘outcome’ and ‘process’ (Luk and Layton, 2004). Lassar et al. (2000) uses SERVQUAL and the Technical/Functional Quality frameworks to examine in private banking the effect of service quality on customer satisfaction. Their findings are that the Technical/Functional Quality model performs better than the SERVQUAL equivalent. The literature on service quality argues that the functional service quality dimension is

of more importance than technical quality in driving satisfaction and loyalty (Grönroos, 1988, 1990; Silvestro and Johnston, 1990; Sweeny et al., 1997). Some other researchers, such as Silvestro and Johnston (1990), Oberoi and Hales (1990), Saleh and Ryan (1991), and Sweeny et al. (1997) also advocate that priority be afforded to functional quality.

Nevertheless, several other researchers (Newman, 2001; Lassar et al., 2000; McDougall and Levesque, 2000; Bell et al., 2005) raise concerns over the importance given to the functional aspect of quality and argue that the technical quality aspect carries equal, or in some cases, more significance. Bell et al. (2005) found that the effect of technical service quality (TSQ) was stronger than functional service quality (FSQ) on customer loyalty. Furthermore, they conclude that clients with high expertise rely more heavily on TSQ rather than FSQ in their decision to remain with an organization. Newman (2001) also reports that effective delivery on 'hard' factors is a necessary pre-condition for overall service quality. He further argues that 'hard quality' i.e. reliability of service delivery is significant and the functional aspect cannot compensate if firms fail to perform on the technical aspects of service quality. Appendix B and Appendix C show some of the research signifying the importance of FSQ and TSQ respectively.

These research findings signify that researchers are now moving on from the traditional attitude of affording priority to the functional rather than to the technical aspect of quality in SERVQUAL analysis, revealing that technical quality is gaining greater attention. In this thesis quality has not been measured on the SERVQUAL scale, but from the functional/relational viewpoint. Reliability as an attribute of dependability was discussed earlier in the work of Barbacci et al. (1995). The technical quality dimension, which is the reliability of service delivery (Newman, 2001), is very closely related to the 'dependability' construct studied in this thesis. Therefore this research primarily deals with two operations performance indicators; dependability and quality. The outcome of this research will add considerably to the service quality literature.

The literature also deals with the trade-off between operations performance indicators (Hayes and Wheelwright, 1984; Hill, 1985; Ferdows and De Meyer, 1990). The trade-off theory states that improvement in one performance indicator is possible only at the expense of the other (Ferdows and De Meyer, 1990). Porter's work (1981, 1985) was among those which argued about the trade-offs among the competitive priorities- cost,

quality, flexibility and dependability. This notion of trade-off was also supported by Hayes and Wheelwright (1984), New (1992), Flynn et al. (1999), and others. Investigating the presence of the trade-off theory between the operations performance indicators in information service settings would be interesting and would also add considerably to the literature on trade-off theory and service quality, which argues the relative significance of quality over dependability. Chapter 2 pointed out that B2B and B2C businesses are different. It is therefore worthwhile here to investigate the relative importance of dependability and quality in the B2B and B2C information service firms. This leads to the third research question of this thesis, i.e.

*RQ 3a: What is the relative effect of dependability and quality in the information intensive B2B service firms?*

*RQ 3b: What is the relative effect of dependability and quality in the information intensive B2C service firms?*

The speed is not mentioned in the research questions since data set for the delivery speed was available only for the one case study. However, while investigating the case study having the speed data, the interrelationship between the three operations performance indicators was investigated (RQ2). The next section summarises and concludes this chapter.

### **3.4 Summary and Conclusions**

This chapter reviews the literature broadly in the area of service operations management, in order to identify the operational performance indicators in services, and focuses mainly on three indicators i.e. quality, dependability and speed that are frequently discussed in information processing firms. The chapter highlights the history of service operations and their subsequent development over four stages suggested by Johnston (1999). The chapter then discusses the service operations model and identifies the two important elements of the model i.e. operational and customer. Since in services, production and consumption of services occurs at the same time, the significance of customers in service operations management has been highlighted. Service operations management involves transformation of input as people, facilities and goods, which go through service process or service experience, resulting in an end

product. Therefore, service experience and service outcome have been elaborated in detail. Thereafter, operations performance indicators in services were indentified. The chapter then reviews the link between the operational performance indicators and customer satisfaction and customer loyalty. The literature shows that dependability and quality significantly affect customer satisfaction. Since this PhD research is focused on the links between dependability, quality and performance outcome, the service concept model, the Service Profit Chain (SPC) and Return on Quality (ROQ) framework were examined in detail. This chapter emphasises that service operations managers need to pay special attention to the operational element in order to gain competitive advantage over other firms. Finally, the chapter proposes a set of research questions for investigation in this thesis.

In summary, the discussions section identified the research gaps in the literature and highlighted the key areas of research. The research identifies the importance of investigating the linkages between dependability, quality and customer satisfaction, in the context of information service settings. This PhD research consists of a theory-testing approach and hence theories identified in literature reviews of Chapters 2 and 3 have been tested in the information intensive firms, i.e.

- *Dependability and Quality affect Customer Satisfaction*
- *Dependability and Quality affect Customer Loyalty*
- *There is a trade-off between Dependability and Quality in information intensive firms*

The literature review spread over Chapter 2 and Chapter 3 also indentifies the following questions that will be investigated in this research;

- *What is the link between dependability, quality and customer satisfaction in B2B and B2C information service firms?*
- *What is the interrelationship between dependability and quality?*
- *Does this interrelationship affect customer satisfaction?*
- *What is the relative effect of dependability and quality in the information intensive B2B service firms?*
- *What is the relative effect of dependability and quality in the information intensive B2C service firms?*

The next chapter discusses the research methodology employed to investigate the research questions posed for this study.

# **Chapter 4**

## **Research Methodology**

## **4.0 Introduction**

The previous chapters presented a literature review in the domain of information economy and service operations management. This chapter provides an overview of the research methodology adopted in this thesis to meet the objective of this research. The chapter presents a discussion of the philosophical thinking prevailing in the social and management sciences. The chapter also argues for the appropriateness of the quantitative research paradigm in this thesis and outlines the research strategy and research design adopted for it. The chapter then describes the case study research and different data analysis methods used to investigate the research questions. The limitations associated with the selected quantitative research methodology are also highlighted.

The chapter outlines as follows. Section 4.1 discusses the common philosophical framework used in the social and management sciences. This section also explains the research paradigm and discusses the positivist and phenomenological approaches. Section 4.2 outlines the research process and research design. This section gives an overview of the research design based on the research strategy adopted and the type of research questions to be addressed. A brief description of the case study research method is presented in Section 4.2.2. The justification for the use of longitudinal data and for the secondary data collection and analysis is given Section 4.2.3.

Section 4.2.4 discusses the case study data analysis methods. The correlation and multiple regressions method used in this research, together with the Meta-Analysis and its applicability, are explained in this section. Section 4.3 concludes the chapter by summarising the major themes covered, along with the research design adopted in this research.

### **4.1 Philosophical thinking in social and management sciences**

Philosophical thinking is vital in social and management sciences as it provides a foundation for designing research. According to Guba and Lincoln (2005) research philosophy encloses a set of beliefs that guide research inquiries. The various



philosophical assumptions prevailing in social sciences are ontology, epistemology, axiology, method, and methodology (Creswell, 1994, Guba and Lincoln, 1988, Easterby-Smith et al., 2002, Creswell and Plano Clark, 2007). Burrell and Morgan (1979) point out that the social science approaches are dependent on these philosophical assumptions. The understandings of these concepts therefore are essential, as the selection of suitable methods for data collection and analysis is practically affected by the chosen philosophical assumptions. This section provides a general idea of the philosophical views, to clarify their significance in research.

Easterby-Smith et al. (2002) argues that the understanding of the philosophical view of the research is helpful in three ways. First it helps to clarify research designs by considering what sort of evidence is required, and how it can be gathered and analysed to provide answers to the questions being investigated. Secondly, it also helps to recognize the appropriate design and its limitations. Thirdly, it further helps to identify, adapt, or even develop, designs that may be outside researchers' past experience. However, the philosophical terms are often misunderstood since some are used interchangeably and need clarification in order to avoid any misinterpretations by the researcher. Table 4.1 presents some definitions of these terms that have been adopted from the work of Easterby-Smith et al. (2002).

<b>Table 4.1: Ontology, epistemology, methodology, and method</b>	
Ontology:	Assumptions that we make about the nature of reality
Epistemology:	General set of assumptions about the best ways of inquiring into the nature of the world
Methodology:	Combination of techniques used to enquire into a specific situation
Methods:	Individual techniques for data collection , analysis etc.

These different philosophical assumptions influence the researcher in the research process and in reporting inquiries. As stated earlier, the inconsistent use of these terms often creates misunderstandings. For example, the term 'methodology' basically encompasses a set of techniques, yet some scholars refer to methodology as an approach adopted for the research (i.e. whether the process of research is deductive or inductive) whilst others define it as just a data management technique (Lincoln and Guba, 2000, Easterby-Smith et al., 2002). Voss et al. (2002) interchangeably uses the terms 'methods and 'methodology' while discussing their case-based research. These examples suggest

that consistency is needed when using these terms within research. In this thesis the term ‘research methodology’ encompasses the philosophical assumptions, research paradigm, data collection and data analysis techniques. The next paragraph discusses in detail the research paradigm.

#### **4.1.1 Research Paradigms**

The philosophical framework forms the foundation for the research. These philosophical views are classified as research paradigms (Meredith et al., 1989, Denzin and Lincoln, 2000) or worldviews (Riege, 2003; Creswell and Plano Clark, 2007). In academic research, these terms are also often used interchangeably. Meredith et al. (1989) defines a research paradigm as ‘a set of methods that all exhibit the same pattern or element in common’. Some other researchers define paradigm as a set of linked assumptions, rules, and perceptions about the world which is shared by a community of scientists (Deshpande, 1983 as cited in Healy and Perry, 2000, Gummesson, 2000). Meredith et al. (1989) also highlight rational/existential and natural/artificial as two key dimensions that shape the philosophical basis for the research activity. The first dimension concerns the nature of reality, arguing whether there is just one reality that is logical and independent of any research, or whether the reality is subjective and socially constructed. The second dimension relates to the source and kind of information used in the research.

A number of researchers in the area of management and social science have classified philosophical views and described their characteristics. Interpretivism (Orlikowski and Baroudi, 1991; Meredith et al., 1989) and critical theory (Meredith et al., 1989; Healy and Perry, 2000) are two of the views frequently discussed in academic literature. Acknowledging the past literature (Slife and Williams, 1995; Lincoln and Guba, 2000; Creswell, 2003; Guba and Lincoln, 2005) Creswell and Plano Clark (2007) categorise four different philosophical views as post-positivism, constructivism, pragmatism, and advocacy and participatism. In management and social science research, positivism and phenomenology are the two broadly dominant philosophical paradigms (Saunders et al., 2000, Easterby-Smith et al., 2002) which are often interpreted as Quantitative and Qualitative methodologies respectively. This thesis adopts the Quantitative approach to address the research questions. The different paradigms proposed by researchers are not

covered in detail here; rather the two dominant methodologies are discussed briefly in the next section.

#### **4.1.2 Positivism and Phenomenology: Dominant paradigms in management research**

##### **a. Positivism**

Positivism is one of the most dominant philosophical views in management research (Saunders et al., 2000; Easterby-Smith et al., 2002). Positivist views are based on real or natural sources of knowledge (Sinha, 1963). Remenyi et al. (1998:33) mention that, in the positivist approach, one of the important assumptions is to see the researcher as independent of the research in the sense that he/she can neither affect nor be affected by the subject of the research. Saunders et al. (2000) see positivism as a research paradigm that is deductive, describes causality, uses quantitative data, utilizes highly structured methodology, and employs controls to allow hypothesis-testing. Sarantakos (2005) reveals that positivism encompasses realist/objectivist ontology and an empiricist epistemology, and follows quantitative methodology. In summary, positivism can be interpreted as a hypothetico-deductive approach, driven by the laws of natural sciences, that seeks theory confirmation and leads to statistical generalisations (Hirschman, 1986; Deshpande, 1983; Riege, 2003; Bryman and Bell, 2007).

##### **b. Phenomenology**

Williams and May (1996) define phenomenology as a method of enquiry that involves systematic investigation of the objects of consciousness. Remenyi et al. (1998) further add to this that phenomenology is context-driven, inter-subjective, and inductive with the researcher as part of the phenomenon studied. Somekh and Lewin (2005) signify that in phenomenology the direct approach looks for shared inter-subjective meanings, relies on consciousness and rational understanding, follows natural attitude, and is detached from the observer. In contrast, the indirect approach involves analysis of the everyday, relies on an ontological understanding, follows shared background practices, and is connected with the observer. In summary, phenomenology can be interpreted as inductive and a theory-building approach (Saunders et al., 2000).

### 4.1.3 Positivism versus Phenomenology: A Critical Overview

The Positivism and Phenomenology approaches have been analysed in the previous paragraphs. Sarantakos (2005) presents the theoretical construction of the positivism and phenomenology approaches (Table 4.2) which are often interpreted through the use of various terms. For example, Easterby-Smith et al. (2002) use the term ‘social constructivism’ for phenomenology, whereas Meredith et al. (1989) use Interpretivism. Positivism deals with the discovery and verification of universal laws resulting in the creation of knowledge where the researcher is independent of the realities s/he seeks to explain. On the other hand, in phenomenology, researcher and subject matter are interdependent, i.e. knowledge creation is assumed to be subjective rather than objective, as defined by the positivists. A critical overview of these two approaches from different researchers’ viewpoints is provided in this section.

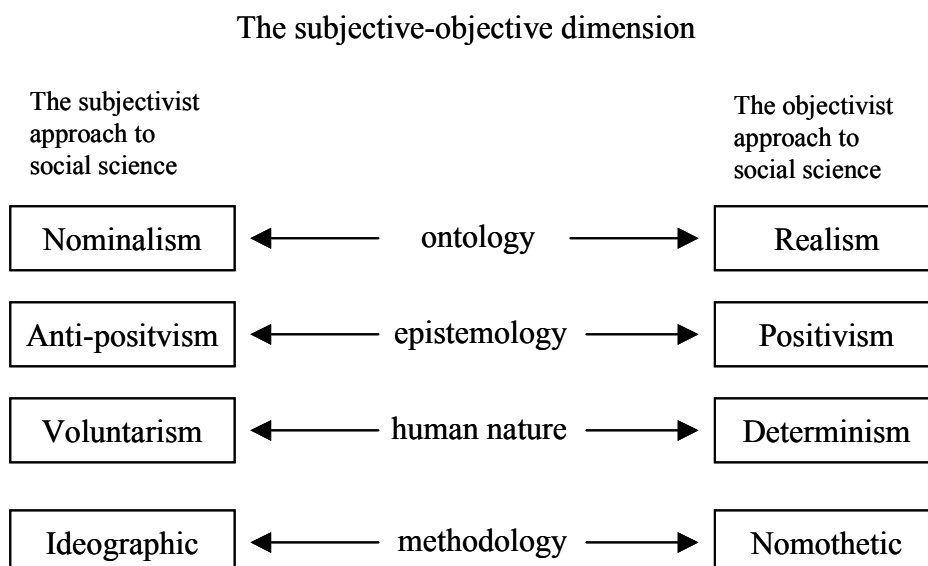
**Table 4.2: Paradigms: Theoretical construction of research  
(Source: Sarantakos, 2005:31)**

	Positivism	Phenomenology
Ontology	Realism/Objectivism	Constructionism
Epistemology	Empiricism	Interpretivism
Methodology	Quantitative	Qualitative
Research	Fixed Design	Fixed/Flexible Design

Positivism and phenomenology are often referred to as quantitative and qualitative methodology respectively (Mangan et al., 2004). The quantitative approach is anchored in empiricism and its methods are empirical. In contrast, the theoretical foundation of the qualitative approach relies on Constructionism and Interpretivism. Dooley (2001) and Creswell (2005) highlight that qualitative research involves direct observation and unstructured interviewing in natural field settings, is emergent and uses multiple methods of data collection. Bryman (1999) provides a critique to the quantitative and qualitative methodology by arguing that quantitative research is preparatory and follows a structured strategy, whereas qualitative research is exploratory and unstructured. In addition, the relationship between researcher and subject is distant in quantitative research, as opposed to qualitative study where it is close. The summarised differences between quantitative and qualitative study were well presented by Sarantakos (2005) as shown in Table 4.3.

<b>Feature</b>	<b>Quantitative</b>	<b>Qualitative</b>
Nature of Reality	Objective; simple; single; tangible sense impressions	Subjective; problematic; holistic; a social construct
Causes and effects	Nomological thinking; cause-effect linkages	Non-deterministic; mutual shaping; no cause-effect linkages
The role of values	Value neutral; value-free inquiry	Normativism; value-bound inquiry
Natural and social sciences	Deductive; model of natural sciences; Nomothetic; based on strict rules	Inductive; rejection of the natural sciences model; ideographic; no strict rules; interpretations
Methods	Quantitative, mathematical; extensive use of statistics	Qualitative, with less emphasis on statistics; verbal and qualitative analysis
Researcher's role	Passive; distant from the subject: dualism	Active; equal; both parties are interactive and inseparable
Generalisations	Inductive generalisations; Nomothetic statements	Analytic or conceptual generalisations; time-and-context specific

**Table 4.4: Comparative assumptions about the nature of Social Science (Source: Burrell and Morgan, 1979)**



The comparative distinction between these two dimensions is indeed necessary to address the appropriateness of the approach adopted in this thesis. Burrell and Morgan

(1979) have attempted to provide an explanation of the contrasting nature of these paradigms by using a subjective–objective continuum (Table 4.4). The distinction is also present in terms of deductive and inductive-based approaches (Bonoma, 1985; Perry, 1998; Remenyi et al., 1998). The deductive approach begins with the development of a theory or hypothesis and involves rigorous testing. In contrast, the inductive approach starts with the data collection and analysis of which leads to the theory’s development (Saunders et al., 2000). Perry (1998) summarises the distinction between these two paradigms in a three dimensional framework categorization (Table 4.5). The major differences between deductive and inductive approaches were outlined by Saunders et al. (2000) and are presented in Table 4.6.

**Table 4.5: Three dimensional framework for categorizing scientific paradigms (Source: Perry, 1998)**

Paradigm	Deduction/ Induction	Dimension Objective/subjective	Commensurable/ incommensurable
Positivism	Deduction	Objective	Commensurable
Critical Theory	Induction	Subjective	Commensurable
Constructivism	Induction	Subjective	Incommensurable
Realism	Induction	Objective	Commensurable

This section has put forward a critical overview of the two dominant philosophical paradigms in management research, in order to clarify any doubts that may arise on the part of the researcher about making the right choice for their research. The next section debates the appropriateness of the chosen approach in addressing the research questions suggested in this thesis.

**Table 4.6: Major differences between deductive and inductive approaches to research (Source: Saunders et al., 2000:91)**

Deduction emphasises	Induction emphasises
<ul style="list-style-type: none"> <li>▪ Scientific principles</li> <li>▪ Moving from theory to data</li> <li>▪ The need to explain causal relationships between variables</li> <li>▪ The collection of quantitative data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Gaining an understanding of the meanings humans attach to events</li> <li>▪ A close understanding of the research context</li> <li>▪ The collection of qualitative data</li> <li>▪ A more flexible structure to permit changes of emphasis as the research progresses</li> </ul>

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<ul style="list-style-type: none"> <li>▪ The application of controls to ensure validity of data</li> <li>▪ The operationalization of concepts to ensure clarity of definition</li> <li>▪ A highly structured approach</li> <li>▪ Researcher independence of what is being researched</li> <li>▪ The necessity to select samples of sufficient size in order to generalise conclusions</li> </ul>	<ul style="list-style-type: none"> <li>▪ A realisation that the researcher is part of the research process</li> <li>▪ Less concern with the need to generalise</li> </ul>
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#### **4.1.4 Philosophical framework adopted in this research**

In management research, positivism has traditionally been much more dominant than phenomenology (Riege, 2003; Meredith et al., 1989). The positivist view favours rationalism, is usually deductive, formally structured, methodologically prescribed, and involves a high degree of objectivity (Meredith et al., 1989). This positivist approach has been criticised by some researchers for its inappropriateness in addressing management-related problems (Remenyi et al., 1998; Saunders et al., 2000). Various researchers have advocated the use of empirical methods rather than the deductive approach (Swamidass, 1991; Flynn et al., 1990; and others).

Phenomenology, has given rise to many criticisms. Often interpreted as qualitative methodology, it has problems related to the time, lack of control and difficulty in the data analysis. Sarantakos (2005) critiques that the qualitative study lacks the degree of accuracy required in research, does not produce comparative data, lacks replication of results, fails to ensure the validity and reliability of its methods, does not produce representative results, and fails to generalize the findings. Bryman (2004) also supports these critiques and adds that qualitative research is too subjective and lacks transparency. Bryman (2004) further states that ‘qualitative findings rely too much on the researcher’s often unsystematic views about what is significant and important, and also upon the close personal relationships that the researcher frequently strikes up with the people studied’. In contrast, quantitative research, in his view, is clearly guided by the literature and key theoretical understandings.

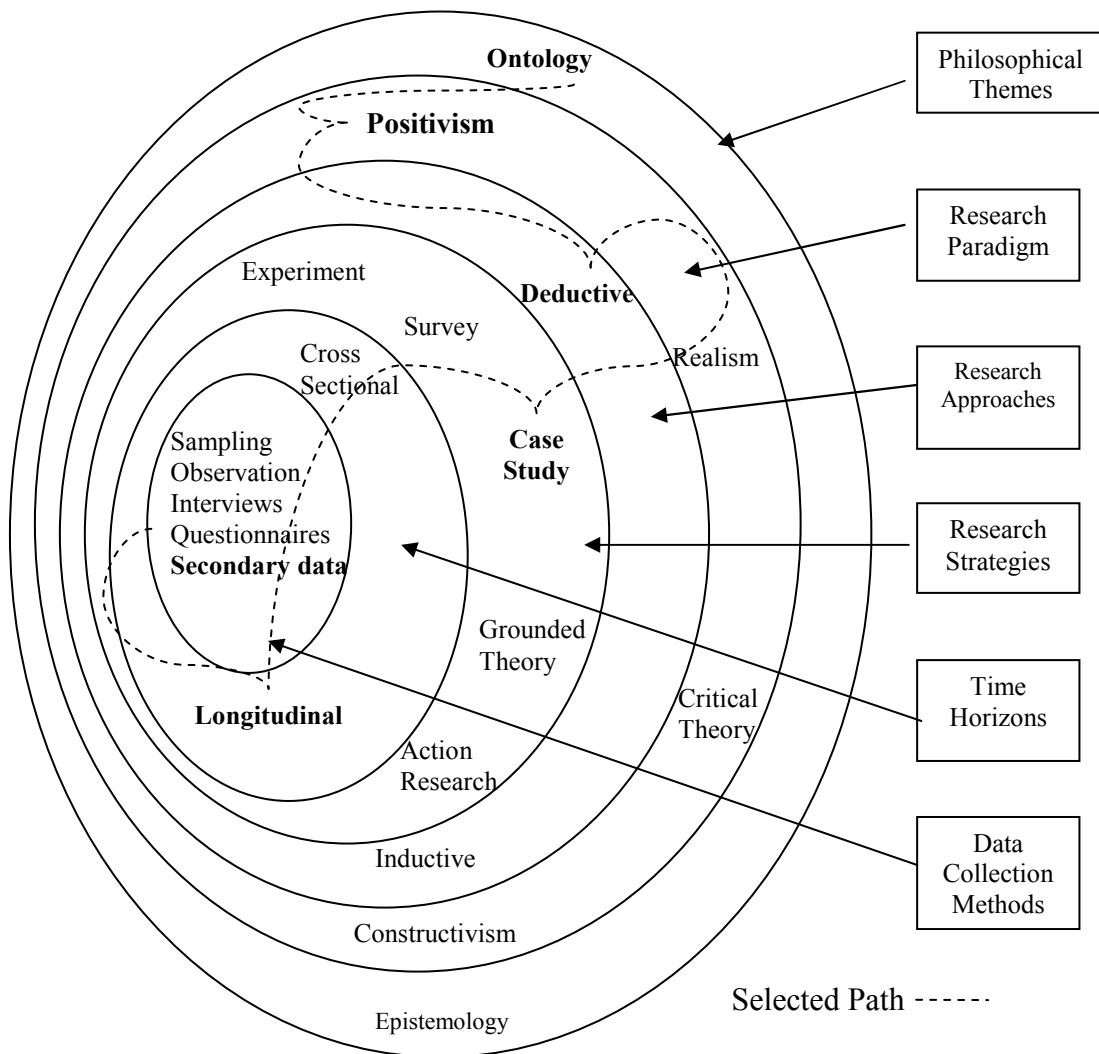
There has been a debate among scholars, as to which is the more efficient methodology for addressing management and business research problems. Quantitative researchers argue that qualitative is a ‘soft research options’ whereas qualitative researchers reject

the quantitative methods as inadequate in handling complex business problems (Sarantakos, 2005). Nowadays the opinion of scholars is somewhat softening and that both approaches have their own merits and demerits. It is accepted that both methodologies are equally valuable and useful in their own context.

In this thesis the selection of the quantitative approach is not motivated by its dominance in management research; rather that the choice has been based purely on the research questions of this thesis. The research questions of this thesis aim to reveal the causal relationships and are underpinned by the theoretical understandings prevailing in the service operations management literature. In quantitative research, theoretical work precedes the data collection. This research therefore supports the positivist approach. Moreover, in a hypothetico-deductive approach, the hypotheses are constructed and guided either by previous theories or are formed by the researcher. Later these hypotheses are tested, based on the gathered empirical data, and accepted or rejected as a part of the theory- testing. These issues will be addressed in the upcoming chapters.

This research aims to test propositions in the information-service settings. A positivist view supports the research of the observable phenomenon (Perry, 1998) and this research involves the observation of the relationship among the operations- performance indicators and customer satisfaction over a period of time. Therefore, the positivist views are well suited for theory-testing research. Also, it is well known that quantitative research involves numbers and this research uses longitudinal time series data to explore the causal relationships. Bryman (2004) further adds that, in quantitative study, researchers are distant from their subjects; this is desirable, as the objectivity of the research subject might be compromised by too close an involvement. Moreover, the structured approach of quantitative research enables the author to examine the precise concepts and issues that are the focus of the research questions. This is a further justification for using the quantitative approach in this thesis. The next section deals with the research process and explains the research design adopted in this thesis.





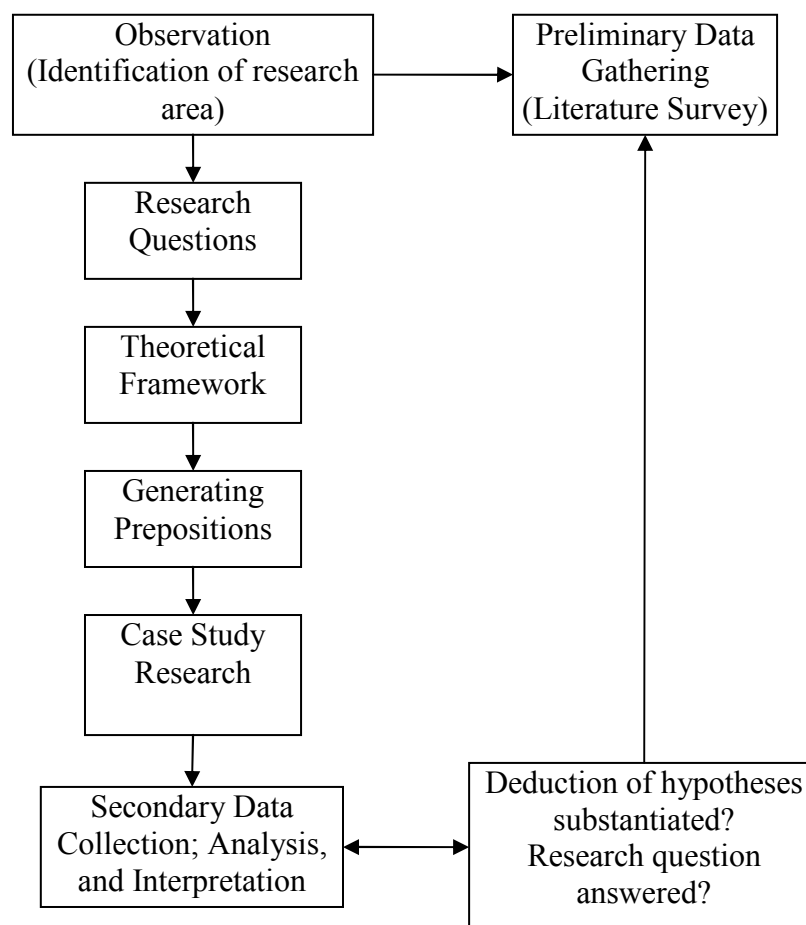
**Figure 4.1: The Research Process ‘onion’ (Source: Saunders et al., 2000)**

## 4.2 Research Process and Strategy

One of the key methodological questions to address is, ‘What is the process of research?’ Williams and May (1996) define the research process as ‘a series of steps and judgement that involve the application of techniques’. Saunders et al. (2000) provide a broad view of the entire research process in the form of ‘research onion’ and point out that research strategy is a general plan of how to approach answering the research questions. Figure 4.1 shows the research process ‘onion’ where each layer depicts a step in the research strategy. The research onion provides guidance to researchers in making methodological choices. This thesis uses the hypothetico-deductive approach to address the research questions. Such an approach involves a number of steps in addressing the research question, such as developing a conceptual framework, deducing hypotheses/propositions for testing, selection of cases, data collection methods and the

analysis of data. Sekaran (1992) termed these steps as the ‘research processes’. In simple terms, the research process involves a strategy that leads to the selection of the research design and method (Bryman, 2004). Figure 4.1 also shows the path of the research through dotted lines. The justification of the selection of philosophical theme, research paradigm and deductive approach for this research has been provided in earlier paragraphs. The justification of the selection of case study approach and longitudinal data selection will be provided later in this chapter.

A clear distinction between the research strategy and research design is needed to avoid any misunderstandings. Research strategy entails the overall approach adopted in the research, whereas the research design provides details of the data collection and data analysis methods employed to address the research questions. Figure 4.2 shows the seven-step research strategy (Sekaran, 1992) for the hypothetico-deductive method adopted here. Research design, an important aspect of the research process, is discussed in the next section.



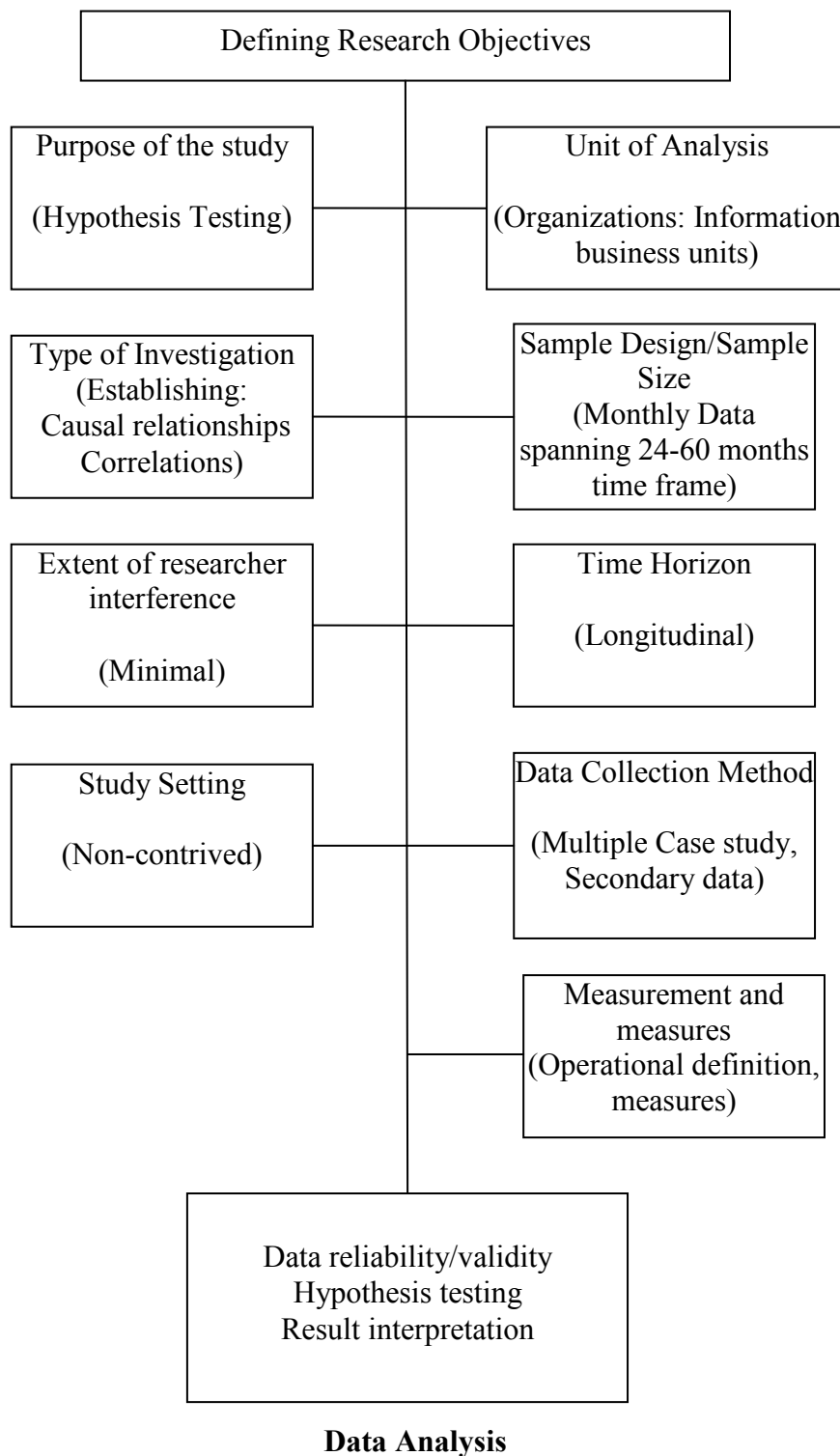
**Figure 4.2: The Research Process (Source: Sekaran, 1992:93)**

### **4.2.1 Research Design**

Bryman (2004) defines research design as a ‘framework for the collection and analysis of data’. Yin (2003) points out that research design is a logical sequence that connects the empirical data to a study’s initial research questions and, ultimately, to its conclusion. There are several design choices available to researchers, such as experimental designs, survey, case study, grounded theory, action research, cross-sectional and longitudinal studies etc. (Saunders et al., 2000; Bryman, 2004; Sarantakos, 2005). Based on the principles of the research design, this thesis adopts the design (Figure 4.3) that best suits its research objectives. The research design is inspired by the work of Sekaran (1992) and Sarantakos’s (2005) six-step design for quantitative research.

As evident from the diagram, the first step of the research design is the selection of the research topic and defining research objectives. The objectives of this thesis have already been stated – in the previous section - and are underpinned by the theoretical, understandings.

The second step of the design involves the selection of the unit of analysis. This thesis uses ‘organisations’ i.e. ‘information intensive firms’ as units of analysis. This step also entails a formal definition of the research topic, exploration and operationalization of the variables. In addition, the formulation of the hypotheses/propositions is also taken at this stage. The third step concerns the selection of the type of study and the sampling methods to be employed. This thesis deals with the investigation of the causal relationships and uses the multiple case study approach, including the longitudinal element. The justification for this is provided in the next section. The fourth step comprises the data collection methods and this research uses secondary time series data collected over a 24-60 months time frame by the chosen information-service firms. The fifth step involves the data analysis, and, in this thesis, data have been subjected to conventional statistical analysis using SPSS, Path Analysis using LISREL 8.54 and the Cumulative Meta-Analysis using ‘Mix 1.7’ software. Path Analysis is used here to explore the causality whereas the Cumulative Meta-Analysis method is used to determine the consistency among the findings of case studies. The final step includes reporting on both the interpretation of the results and on the findings in the form of a thesis and publishable articles.



**Figure 4.3: The research design adopted in this thesis**

This section explained briefly the research design adopted in this thesis. A diagrammatical representation was provided, along with the explanation, to demonstrate clearly the research design. The upcoming section will explain and debate the use of the multiple case study approach in this work. In addition, a brief description of the longitudinal time series data, secondary data collection, and data analysis methods are also discussed.

## 4.2.2 Case Study Research

The case study approach has been gaining popularity in operations-management research in recent years (Meredith, 1989; Ebert, 1991; Perry, 1998; Pannirselvan et al., 1999; Meredith and Samson, 2001; Sousa and Voss, 2001; Stuart et al., 2002; Voss et al., 2002; Riege, 2003). Bromley (1986) points out that case studies are research models encapsulating a number of methods of data collection and analysis in a variety of contexts. Case studies may have multiple or single sources of information. Single sources of information provide a holistic overview of the phenomena whereas, the multiple sources allow for the use of methodological triangulation. Singhal et al. (2008) and Barratt et al. (2010) points out that in operations management researchers have adopted both one method and multiple method data collection approaches in the case study research. Although, multiple sources of data are usually preferred in case study research several researchers have used the primary data source in their case study approach such as Markus (1983), Gersick (1988), Tax and Stuart (1997), Argyres (1999), and Anderson et al. (2004). For example, Markus (1983), Tax and Stuart (1997) and Argyres (1999) use only the interview data in their case study whereas Gersick (1988) just uses the observation data.

Yin (2003) and Sarantakos (2005) argue that a case study is used to investigate a specific phenomenon and context in-depth, which is either poorly understood or just emerging. Yin (2003:13) also provides a most helpful definition of the case study as *'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident'*. Case study allows the use of a number of interrelated methods and sources, and produces information covering the whole unit, not just one particular aspect (Sarantakos 2005). Although case studies have many benefits, they are generally criticized for their lack of controllability, deductibility, repeatability and generalisability (Kerlinger, 1986; Bromley, 1986; Lee, 1989; Meredith, 1989; Voss et al., 2002; Yin, 2003). However, Boyer and Swink (2008) state that using the proper data collection technique and mixing of methods can substantially mitigate the risks of using case studies. This section will debate the appropriateness of, and need for, the case study through quantitative research.

Sarantakos (2005:212) outlines some of the basic criteria in case study research. Accordingly, to this argument, case study research, which is conducted in natural

settings, is suitable for pursuing in-depth analysis; it studies whole units; and entails single or multiple cases. Yin (2003:21) states that there are five components of the research design which are very important for case based research: (i) study research questions; (ii) study propositions; (iii) units of analysis;(iv) the logic of linking data to the propositions; (v) the criteria for interpreting the findings.

An important aspect in the case study research is also its quality. Reliability and validity are used to test the quality of the case research design (Kidder and Judd, 1986; Voss et al., 2002; Yin, 2003). Yin (2003) points out four tests that are relevant to the case study research. Construct validity is concerned about the extent to which the correct operational measures are being studied (Voss et al., 2002). Yin (2003), Voss et al. (2002) and others indicate that one way to test the construct validity is through observing whether predictions made about relationships to other variables are confirmed. If the construct measured can be differentiated from another, it provides justification for discriminant validity. Voss et al. (2002) point out that internal validity is achieved through establishing causal relationship among the measures (Yin, 1994:36). Voss et al. (2002) further state that external validity is about identifying whether the findings can be generalised beyond the present case study. And finally, reliability is the extent to which a study's operations can be replicated with the same results (Yin, 1994; Voss et al., 2002).

This thesis adapts the case study-based approach for theory testing. Case research has been used for both theory-testing and theory-development (Voss et al., 2002; Yin, 2003). Voss et al. (2002) provide a framework (Table 4.7) for the selection of case research that was adopted from the original work of Handfield and Melnyk (1998). Pare (2001) summarized the four types of positivist case studies based on single/multiple cases and theory-testing/theory-building approaches in information systems (Table 4.8). This thesis uses a theory-testing approach where the established theories from service quality and service-operations management are examined using the secondary data source collected by the data collection agencies and the participating firms. The annual reports of the participating firms were also referred to. It is clearly evident, from Table 4.7, that the theory-testing approach favours multiple case studies. The case study research has been used for theory-testing in operations management (Pagell and Krause, 1999; Boyer and McDermott, 1999; Voss et al., 2002). Therefore, this thesis will add to the theory-testing, case- based approach.

<b>Table 4.7: Matching research purpose with methodology</b>		
<b>Purpose</b>	<b>Research Question</b>	<b>Research Structure</b>
<i>Exploration</i> Uncover areas for research and theory development	Is there something interesting enough to justify research?	In depth case studies Unfocused, longitudinal field study
<i>Theory building</i> Identify/describe key variables Identify linkages between variables Identify “why” these relationships exist	What are the key variables? What are patterns or linkages between variables? Why should these relationships exist?	Few focused case studies In-depth field studies Multi-site case studies Best-in-class case studies
<i>Theory testing</i> Test the theories developed in the previous stages Predict future outcomes	Are the theories we have generated able to survive the test of empirical data? Did we get the behaviour that was predicted by the theory or did we observe another unanticipated behaviour?	Experiment Quasi-experiment <b>Multiple- case studies</b> Large-scale sample of population
<i>Theory extension/refinement</i> To better structure the theories in light of the observed results	How generalisable is the theory? Where does the theory apply?	Experiment Quasi-experiment Case studies Large-scale of population

Source: Voss et al. (2002:198) and Handfield and Melnyk (1998)

A case is classified either by size, as one single case or multiple cases, or by the nature of the case as simple or complex. This thesis uses ‘organisations (information business units)’ as a unit of analysis. Yin (2003) suggests that the single case study is appropriate if the objective of the research is to explore previously un-explored subject, whereas multiple case studies are desirable when the intent of the research is descriptive, theory-building or theory-testing. Voss et al. (2002) provides a detailed description of possible choices in different case approaches (Table 4.9). The academic literature does not provide any clear guidance on the number of cases to be included in multiple case studies (Perry, 1998; Lincoln and Guba, 1985). Eisenhardt (1989:545) suggests that usually four to ten cases are enough for a research study. This research entails the study of five cases from different information intensive service firms.

The suitability of case studies for research into the management research areas, such as customer relationship marketing, customer decision making, organisational behaviour,

customer satisfaction, strategic management, human resource management, and knowledge management has been pointed out by many researchers (Riege, 2003; Godfrey and Hill, 1995; Donnellan, 1995; Eisenhardt and Graebner, 2007). Recently the evidence of case studies in information services systems, service design and other fields of operations management, shows new favourable trends towards the use of case-based research (Orlikowski and Baroudi, 1991; Klein and Myers, 1999; McCutcheon and Meredith, 1993; Paré, 2001; Karmarkar and Apte, 2007). A number of scholars have also advocated the use of longitudinal case studies, as they allow the researcher to

**Table 4.8: Summary of Four Exemplary Positivist Case Studies in IS**

	<b>Keil (1995)</b>	<b>Paré and Elam (1997)</b>	<b>Markus (1983)</b>	<b>Sambamurthy and Zmud (1999)</b>
Research Purpose	Theory Building	Theory Building	Theory Testing	Theory Testing
Case Design	Single	Multiple	Single	Multiple
Research Objective(s)	To determine whether the escalation phenomenon could be observed and if so, to identify the reasons why it occurs	To provide a deeper understanding of the dynamics of the system implementation process	To provide theoretically-driven explanations that account for people's resistance to system implementation	To provide explanations of how several contingency forces actively influence firms' IT governance arrangements
Research Site(s)	The identity of the company and of its industry have been disguised to provide anonymity	Three distinct organizational units at a large tertiary care teaching hospital	A large manufacturing firm	Eight large firms from various industrial sectors
Theoretical Focus	IT project escalation predictors	Teleology theory of change	Three rival theories of user resistance	Theory of multiple contingencies
Key Findings	Escalation is promoted by a combination of project, psychological, social and organizational factors	A series of research propositions reflecting the dynamic nature of the implementation process	Data from the case study demonstrate the superiority of the interaction theory of resistance	Data show how three scenarios of multiple contingencies (reinforcing, conflicting, and dominating) influence firms' IT governance modes

Source: Pare (2001)

identify the causality (Bryman, 2004; Voss et al., 2002; and others). Voss et al. (2002:202) state that 'the longer is the duration over which phenomena are studied, the greater the opportunity to observe at first hand the sequential relationships of events'. The problems of access to the data however impose some limitations on longitudinal case study. Pare (2001) argues that positivist case studies can be descriptive, exploratory or explanatory and each approach can use either single or multiple-case studies. The choice of multiple-case studies was strengthened by the explanatory nature of the research questions, following the positivist multiple-case based approach. In this



research secondary data set collected from the data collection agencies and by the participating firm was used. In addition, the annual published reports of the participating firms were also referred. Literature using case study in information service settings is scarce. In this thesis I expect to fill the gaps of the longitudinal case study of quantitative research in information-service settings. The forthcoming sections will briefly explain the need for the longitudinal element in a case study as well as the data collection method adopted in this thesis.

**Table 4.9: Choice of number and type of cases (Source: Voss et al., 2002:203)**

<b>Choice</b>	<b>Advantages</b>	<b>Disadvantages</b>
Single cases	Greater depth	Limits on the generalisability of conclusions drawn. Biases such as misjudging the representativeness of a single event and exaggerating easily available data
Multiple cases	Augment external validity. Help guard against observer bias	More resource needed, less depth per case
Retrospective cases	Allow collection of data on historical events	May be difficult to determine cause and effect, participants may not recall important events
Longitudinal cases	Overcome the problems of retrospective cases	Have long elapsed time and thus may be difficult to do

### **4.2.3 Data Type and Data Collection Methods**

#### **a. Longitudinal time series data**

The explanatory nature of the research questions demands that, in order to explore the causality, the variables need to be studied over time. Under such requirements, a longitudinal study is the preferred method (Sekaran, 1992; Weiss, 2005). Saunders et al. (2000) point out that the strength of longitudinal research lies in its ability to study change and development. Researchers (Biddle et al., 1985; Einhorn and Hogarth, 1986; Zhou et al., 2005; Ulaga and Eggert, 2006; Griffith and Lusch, 2007) have already argued that cross-sectional data provides only a glimpse of a sample of a population, as they are just a snapshot i.e. data is gathered just once. Moreover, Gayle (2004) points out that cross-sectional data undertakes analysis only between cases.

In contrast, longitudinal studies deal with the process of change over a period of time. Findings from longitudinal investigations also help to infer causality in ways that are not possible in cross-sectional studies (Hawk and Aldag, 1990). Adams and Schvaneveldt (1991) report that longitudinal study also permits the researcher to employ control over the observed variables under the condition that they do not become affected by the research process itself. Since this PhD research aims to explore causality among the variables (operations performance indicators and customer satisfaction), longitudinal time series data was preferred.

The use of longitudinal time series data has also been supported in management and social research by many scholars such as Amburgey and Dacin (1994), Monge (1990), Mohr (1988), Menard (1991), Bergh & Holbein (1997), Pettigrew (1990), and others. Hedeker and Gibbons (2006) point out that, in recent years, researchers have shown greater confidence in longitudinal studies. Though the longitudinal studies have gained popularity, many researchers such as Bowman (1990), Ragins and Cotton (1999), Chao et al. (1992), Noe (1988), Pettigrew et al. (2001), and others still argue the need for more longitudinal studies in management research. Therefore, this thesis will attempt to develop the overwhelming demand for the longitudinal study in management research.

#### **b. Secondary Data collection and analysis**

There are several ways of collecting the quantitative data for case studies, such as surveys, questionnaires, structured observations etc. However, a large amount of the data is also collected by researchers, government agencies, private data collection organisations and others (Bryman, 2004; Sarantakos, 2005). The data collected from these sources are termed secondary data, as researchers using the data were not involved in its collection and the data is being re-analysed. Secondary data attracts researchers, as the data collected, analysed and archived by the various organisations covering wide areas, are relatively representative, lend themselves to comparisons and are longitudinal (Sarantakos, 2005). Bryman (2004) points out that secondary data are usually of high quality, as rigorous sampling procedures are employed and experienced researchers or data collection agencies are involved, following a structured approach and control procedures to ensure the quality of the collected data. The high quality of the data makes it a favourable choice for the researcher. Bryman (2004) further identifies that it offers the opportunity of longitudinal analysis and is less time-consuming, thus

providing more time to the researcher for the data analysis. Also, the re-analysis of the data, either using a different analysis method or guided by new theoretical ideas, provides a new insight from the same data set (Sarantakos, 2005).

Although secondary data inherits many advantages, the secondary analysis has some limitations. Since it is pre-collected data, the researcher using the data lacks familiarity (Bryman, 2004). The researchers therefore need to familiarize themselves with the data and identify details, such as the way it was collected and coded, and other aspects of its organisation. Bryman (2004) also points out that the complex nature of the data and lack of control over the quality put limitations on the use of the secondary data. In addition, the absence of the key variables is a major limitation. This restricts the researcher in examining certain variables which can be often avoided when data is collected by the researchers themselves.

Dale et al. (1988) point out that secondary data is often used in quantitative and statistical analysis involving longitudinal study. The objective of this thesis is to explore the causal relationship which requires longitudinal time series data so the choice of secondary data was justified. The secondary data used in this research was collected from the selected information intensive service firms themselves or by the data collection agencies working on their behalf over the period of 24-60 months. Recognising the limitations with the secondary data, careful consideration was given, in this research, to become familiarized with the collected data. The next section explains the case study data analysis methods used.

#### **4.2.4 Case Study Data Analysis methods**

Once the case study data collection is over the next step involves the analysis of the data. Many researchers have discussed the details of the case study data analysis (Eisenhardt, 1989; Voss et al., 2002; Yin, 2003; Bryman, 2004; Sarantakos, 2005). This thesis adopts the quantitative research paradigm therefore the quantitative data analysis was preferred. Sarantakos (2005) states that quantitative analysis involves a primary analysis dealing with the raw data; a secondary analysis that includes previously collected data; and a Meta analysis.

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**Table 4.10: Steps of Quantitative Analysis (Source: Sarantakos, 2005:364)**

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- Data preparation: Checking, editing and coding
  - Data entry: Entering the data in the computer
  - Graphic presentation: Presenting the findings in the form of graphs or tables
  - Data processing and analysis: Conducting statistical analysis
  - Interpretation of the findings: Explaining the meaning of data individuality
  - Conclusions: Proposing direct answers to the research question
- 

This thesis entails all three types of analyses frequently used in quantitative research. The use of modern, computer statistical packages brings many advantages, such as fast data processing and analysis, high reliability, accuracy, and it makes the analysis part of the research much easier (Bryman, 2004; Sarantakos, 2005). This research uses statistical packages such as SPSS, LISREL and Mix to perform the analysis. Sarantakos (2005:364) presents a set of steps involved in the quantitative data analysis (Table 4.10).

#### **4.2.5 Correlation and Regression Analysis**

This thesis shows a number of variables to be studied across five different cases from the information intensive service firms. These variables were identified earlier in the literature review (dependability, quality, speed, customer satisfaction and customer loyalty) and will be defined later in the data analysis chapters. Since this section deals with the data analysis methods, correlation and regression analysis is discussed.

This thesis studies the relationship between the operations performance indicators and customer satisfaction. Correlation analysis, therefore, plays an important role in assessing the existing relationships among themselves. To interpret correlation values, three pieces of information are needed: the correlation coefficient, the statistical significance of the coefficient; and the size of the sample (Somekh and Lewin 2005). A very large sample having a weak coefficient can still be significant whereas in small samples only a very strong correlation will be statistically significant. Though correlation helps in predicting the relationship between the variables, one should be clear that correlation does not imply causation. This means that changes in one variable may not be directly caused by the independent operation of the other variable. There might be one or more other variables affecting them, which may not have been considered by the researcher. To explore the causality among the variables, this study uses a well-known statistical tool, the path analysis method, which will be discussed in upcoming chapters. Sarantakos (2005:377) points out that correlation identifies three major aspects of relationships:

1. The presence or absence of a correlation, i.e., whether or not there is a correlation between the variables in question
2. The direction of correlation i.e., whether an existing correlation is positive or negative
3. The strength of a correlation i.e., whether an existing correlation is strong or weak.

Correlation analysis predicts the strength and the direction of the relationship but does not show or explain the amount of variance, especially when, simultaneously, several independent variables are theorized (Sekaran, 1992). Regression is favoured for the prediction and modelling of causal relationships. In this thesis multiple regression analysis was used to identify the amount of variance explained by independent variables, as well as to predict the causal relationship between them (Sekaran, 1992). In this thesis some other statistical tests were also used, such as descriptive analysis, ANOVA analysis to determine if there are significant mean differences among more than two groups, Path Analysis to further verify the causal relationships and finally the Cumulative Meta Analysis to identify any consistency among the findings from the different case studies. The next section will give an overview of the Meta Analysis method and its growing popularity in management research.

#### **4.2.6 Meta-Analysis**

In recent years researchers' orientation towards quantitative research has led to an increased acceptance of the Meta-Analysis-based research (Forza and Nuzzo, 1998). Smith and Glass (1977) defines Meta-Analysis as a method to combine the results of all the studies in a way that takes into account the magnitude of the findings, the sample size, and the quality of the research. Streiner (2003) defines it as 'a technique for combining the outcomes of results of many studies in a rigorous and systematic manner'. These definitions have also been widely recognized by other researchers such as Hunter et al. (1982), Forza and Nuzzo (1998), Davies and Crombie (2001), Nair (2006), and Saleh et al. (2006). Forza and Nuzzo (1998) further adds that Meta-Analysis combines the information from the previous studies to answer, essentially, the same research question, whose purpose is to broaden the base for the synthesis. The objective behind assembling the studies together is to provide large enough samples for reliable

statistical conclusions (Peto, 1987; Thompson and Pocock, 1987; Saleh et al., 2006). Davies and Crombie (2001) add that the conclusion achieved through one study tends to be inconclusive; however Meta-Analysis involves aggregating studies in a systematic and unbiased way therefore allowing a clearer picture to emerge. Meta-Analysis basically answers three general types of questions.

1. *The first type of question deals with the identification of the relationship between the two variables, through statistically summarising the significance levels, effect sizes and confidence intervals.*
2. *The second type involves comparison of the studies based on the degree of variation.*
3. *The third type generally attempts to explain the variability through moderating variables.*

Johnson et al. (1995) provided a comparative analysis of these three approaches (Table 4.11). Therefore, before conducting the Meta-Analysis one needs to choose the approach that best fits. Traditional Meta-Analysis overlooks the two important aspects of sufficiency and stability. Sufficiency asks whether the meta-analytic database adequately demonstrates the research objectives and stability means to the shift over time in the accruing evidence (Muellerlelle and Mullen, 2006). To overcome these shortcomings of traditional Meta-Analysis, another type of Meta-Analysis termed Cumulative Meta-Analysis is preferred (Hunter et al., 1982). Cumulative Meta-Analysis refers to the process of performing new meta-analyses at successive points in time in a research domain (Muellerlelle and Mullen, 2006). Therefore each time a database is added, a separate Meta-Analysis is performed. Forza and Nuzzo (1998:840) provide a five step procedure to conduct the Meta-Analysis:

- (i) Problem Formulation;
- (ii) Data Collection;
- (iii) Data Evaluation;
- (iv) Analysis and Interpretation of data; and
- (v) Presentation of results.

The fourth step involves data analysis either in terms of mean differences, weighted regressions, standard deviations, correlations or effect sizes. It also includes the selection of one of the three qualitative models i.e. equal effects model, fixed effects model, or random effects model for combining the evidence across similar studies. Forza and Nuzzo (1998:840) suggested that the equal effects model is used to control Meta Analytic study data base through the statistical parameters such as correlations, standard errors, standard deviations or means. Hence the model is preferred when the statistical parameters of interest are same for each study. Further they point out that fixed effect model are preferred when the studies included in the analysis are combined by assigning weights to each study. In addition, Forza and Nuzzo (1998:840) stated that the random effects model is preferred ‘when researcher is interested to describe the randomness that controls the results observed in the studies available’.

**Table 4.11: Comparative view of the three major approaches in Meta-analysis (Source: Johnson et al. 1995)**

<i>Three Meta-Analytic Approaches and the Basic Analytic Questions of Central Tendency, Variability and Prediction</i>			
General analytic question	Hedges and Olkin (1985)	Rosenthal (1991); Rosenthal and Rubin (1978)	Hunter and Schmidt (1990); Hunter, Schmidt and Jackson (1982)
Central Tendency	Mean weighted effect size; confidence intervals (significance levels)	Mean weighted effect size; combined probability (significance levels)	Mean weighted effect size; confidence intervals (significance levels)
Variability predictions	Homogeneity statistic; Continuous models; categorical models; contrasts between mean weighted effect sizes	Diffuse comparison of effect sizes; Correlations; blocking; focused comparison of effect sizes	Test of no variation across effects; Correlations; blocking

However, as every method has some pros and cons, Meta-Analysis also exhibits some flaws. Davies and Crombie (2001) signify that, in Meta-Analysis, the chances of combining incomplete or biased individual studies presents a major problem. Another problem is of heterogeneity i.e. the extent to which the different kinds of studies are mixed. Since the studies vary on different dimensions, the inclusion therefore of the only studies related to a specific question makes sense in order to have a precise answer to a specific question. In addition, the differing interventions applied between individual studies, and the differing primary outcomes, examined between studies, are some of the other problems linked with Meta-Analysis. Moreover, Davies and Crombie (2001) point out that all the studies are carried out in distinct settings which may differ noticeably between the studies included and may contribute to the success or failure of the intervention being tested.

Meta-Analysis has been applied successfully in the field of psychology, clinical studies, archaeology, astronomy, geophysical science, and public policy (Forza and Nuzzo, 1998; Greenland and Longnecker, 1992; Nair, 2006; Saleh, 2006). Recently many researchers have advocated the application of Meta-Analysis to management research (Forza and Nuzzo, 1998; Streiner, 2003; Nair, 2006). Forza and Nuzzo (1998) argue that Meta-Analysis is suitable for management researchers, because of the increasing acceptance of quantitative research in management disciplines (Hedges and Olkin, 1985). The quantitative nature of this thesis makes Meta-Analysis a suitable technique for combining the results of the case studies. This thesis uses the Meta-Analysis to combine the findings of the five case studies and to offer a large enough sample to provide a strong statistical basis for concluding its findings. This research follows the second type of Meta-Analysis that involves comparison of the studies based on the degree of variation. The thesis uses the Cumulative Meta-Analysis technique to overcome the shortcomings of the traditional Meta-Analysis. This analysis was performed using the Meta-Analysis software Mix 1.7 (Bax et al. 2006, 2008) that uses Excel 2003 as its calculation and programming platform. The primary aim of the Meta-Analysis in this thesis is to see whether the five different cases from B2B and B2C information service firms, attempting to answer the same set of research questions, are producing consistent results. The next section summarises and concludes this chapter.



### **4.3 Summary and Conclusions**

This chapter reviews the research methodology adopted in this thesis. The chapter starts with an overview of the philosophical thinking behind social and management research. The significance of the philosophical views in the research design was elaborated on and common misinterpretations of the frequently used terminologies were clarified. Positivism and phenomenology emerged as two broadly dominating paradigm in the management research. Both paradigms were critically reviewed and compared against each other over various dimensions such as quantitative/qualitative, subjective/objective, and so on to offer a clearer understanding. Thereafter, the chapter debates the appropriateness of the positivist view for addressing the research objectives.

A brief description of both the research process and the research design was also presented. The research process was explained through the ‘research onion’ (Saunders et al., 2000) where each layer depicts a step in research strategy. This thesis follows the hypothetico-deductive approach to address the research questions. A detailed description of the quantitative research design strategy, including the steps of the research, was presented. The chapter then explains the increasing popularity of case-based studies in management research.

The chapter also describes the data collection methods and the type of data used in this research. As this thesis aims to investigate the causality among the variables studied, it was argued that longitudinal time series data best suits the aims and objectives of this research. The justification for the use of the secondary data was also provided along with its limitations. The chapter also examines the case data analysis methods. This thesis employs correlation and multiple regression analysis and their benefits were explained in detail. The thesis also uses the Meta-Analysis method to integrate the findings of all the five cases and check the consistency among the findings from different cases. A brief description of the Meta-Analysis method was presented and a justification was given for the selection of the Cumulative Meta-Analysis method. In Cumulative Meta-Analysis each time a new database is added, a separate Meta-Analysis is performed (Muellerlelle and Mullen, 2006).

In summary, this chapter outlines the research framework used here in the research process. The following chapters will elaborate the findings from all the five cases

studied in three phases. The next chapter deals with the findings of the first phase of the data analysis.

# **Chapter 5**

## **Data Analysis**

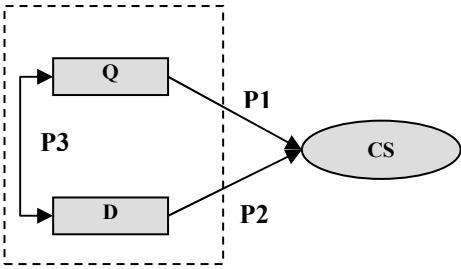
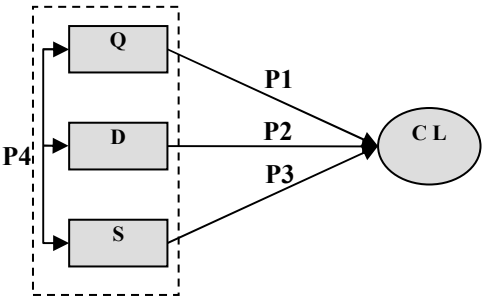
### **Phase I**

## 5.0 Introduction

This chapter discusses the first phase of the data analysis that involves investigating B2C case studies. The three cases studied in this chapter are taken from different B2C information intensive service firms. A number of propositions are tested for each case. The first case study is of a large retail banking firm operating in the UK, the second case study is of a large utility provider also operating in the UK. The third case study is of the largest telecommunication firm operating in the UK. Longitudinal time series secondary data set, between 24 to 60 months time frame, was analysed to answer the research questions.

The research questions and research objectives, together with the propositions tested for each case, are presented in Table 5.1. The first two case studies attempt to investigate the operations performance and customer satisfaction link whereas the third goes one step further to test the relationship between three elements of operations performance (dependability, quality and speed) and customer loyalty. The next section analyses in detail the first B2C case study of this research.

<b>Table 5.1: Research questions, research objectives and propositions tested in the first phase of data analysis</b>	
<b>Research Objectives</b>	<ul style="list-style-type: none"> <li>• To investigate the linkage between dependability, quality and customer satisfaction in B2C information service settings.</li> <li>• To investigate the linkage between three operations performance indicators (dependability, quality and speed) and customer loyalty in B2C information service settings</li> <li>• To investigate the interrelationship among the operations performance indicators</li> <li>• To explore the relative effect of dependability and quality on customer satisfaction in B2C</li> </ul>

<p style="text-align: center;"><b>Research Questions</b></p>	<p>information intensive service firms</p> <ul style="list-style-type: none"> <li>• What is the link between dependability, quality and customer satisfaction B2C information service firms?</li> <li>• What is the interrelationship between dependability and quality? Does this interrelationship further affect customer satisfaction?</li> <li>• What is the relative effect of dependability and quality in information intensive B2C service firms?</li> </ul>
<p style="text-align: center;"><b>Case Study I and Case Study II propositions</b></p> 	<ul style="list-style-type: none"> <li>• <b>P1:</b> Customer Satisfaction is positively correlated with Quality</li> <li>• <b>P2:</b> Dependable service leads to satisfied customers i.e. Customer Satisfaction is positively correlated with dependability</li> <li>• <b>P3:</b> Dependability and Quality are positively correlated</li> </ul>
<p style="text-align: center;"><b>Case Study III propositions</b></p> 	<ul style="list-style-type: none"> <li>• <b>P1:</b> Customer Loyalty is positively correlated with Quality</li> <li>• <b>P2:</b> Customer Loyalty is positively correlated with Dependability</li> <li>• <b>P3:</b> Customer Loyalty is positively correlated with Speed</li> <li>• <b>P4:</b> There is an interrelationship between operations performance indicators</li> </ul>

## **5.1 Case Study I**

The first case study is based on the longitudinal time series data set collected from a retail bank operating in the UK. The secondary data set received from the firm was collected by the firm and by the data collection agencies working on behalf of the firm over the period of 36-60 months following a set of data collection protocols. The brief overview of the firm is presented in the next section.

### **5.1.1 Overview of the firm: Retail Bank**

The retail bank studied in this thesis is part of a leading financial services group, providing for personal and corporate customers a wide range of banking and financial services, primarily in the UK. Because of a confidentiality agreement the name of the bank has not been revealed and is referred to as Bank 'XYZ' throughout. The 'XYZ' bank has more than 2,000 branches across the UK and serves more than 30 million customers. The XYZ bank, additionally, has the highest proportion of current account holders and of customers using internet banking. The strategic aim of the XYZ bank is to become Britain's best retail bank through building strong relationships with their customers by offering products and services at affordable prices, delivering a high quality service and continuously improving productivity and efficiency.

According to the annual report, published in May 2009, the XYZ bank is performing well financially and its profit before tax increased by 4% in 2008 in comparison with 2007, reflecting strong levels of franchise growth and effective cost management which offset the higher impairment charge. In 2008 the income of the bank also went up by 7% whilst operating expenses remained well controlled, increasing by just 2%. Furthermore, the bank's trading surplus increased by 11% while the customer deposit base increased by 5% in comparison with 2007. Their internet and telephone banking channels moreover performed strongly with annual sales growth of 29% and 19% respectively. A sign of considerable improvement in the quality of service is also evident in their telephone banking.

The XYZ bank is also keen on continuously improving the quality of their services to their customers. The company collects robust data over time to measure their own

service quality performance. Access to the robust statistical data covering all the key constructs used in this research made it a favourable case selection. The next section details the research objectives for this particular case study.

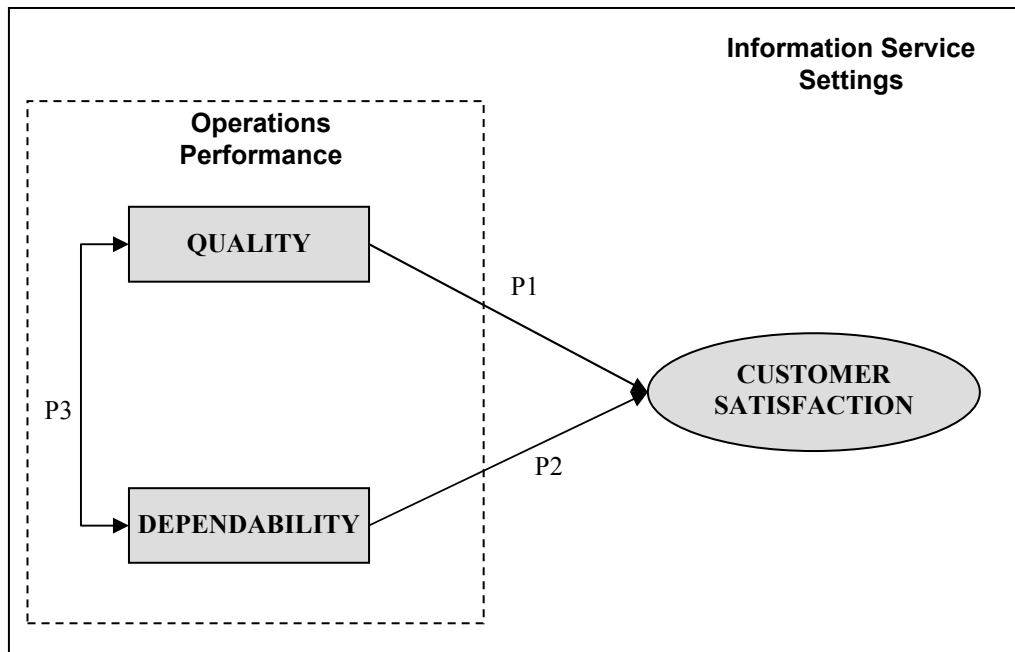
### **5.1.2 Research Objectives**

The literature review highlights operations performance indicators that affect customer satisfaction. This study focuses on the effects of dependability and quality on customer satisfaction. This case study is a confirmatory one which aims to test the findings of service operations management and service quality literature, particularly in the context of information service settings. This study aims to address the research objectives and research questions pointed out earlier in this chapter. This case study sets out to test the following findings from the literature in the context of information service settings:

- Dependability and Quality affect Customer Satisfaction
- There is a trade-off between Dependability and Quality in information intensive service firms

The trade-off between operations performance indicators has already been discussed in detail in the literature review chapter on service operations management. This thesis attempts to verify the existence of the trade-off theory in the information services setting. This case study deals with three variables dependability quality and customer satisfaction. In this thesis dependability is an ability to perform the promised service dependably and accurately, including time commitments (Hayes and Wheelwright, 1984; New, 1992; Flynn et al., 1999; Slack et al., 2004; Raajpoot, 2004; Taner and Antony, 2006). The firm did not employ any specific parameters to measure the dependability variable. The data for the firm's service level agreement with customers therefore was considered as a proxy for the dependability variable. The firm also did not employ SERVQUAL scale to measure the quality construct. However, the measures used by the firm resemble to some of the items of the SERVQUAL scale. The measured variable will be operationalized later in detail. The constructs studied in this case study conform to the reliability and validity tests examined in the research methodology chapter. The model tested for case study I is shown in Figure 5.1. The test results are discussed later in the research findings section.

The theoretical foundation for this research is grounded in SERVQUAL and service profit chain literature. Recently, Maddern et al. (2007), conducted empirical work to identify the drivers of customer satisfaction. The central argument of this work suggests that the hard factor i.e. dependability/reliability significantly affects customer satisfaction (Maddern et al., 2007). The objective of this research is therefore twofold: to verify or refute the constructs presented in the Maddern et al. (2007) model; to explain the inter-relationship between dependability and quality.



**Figure 5.1: Research Framework for Case Study I**

The propositions tested by Maddern et al. (2007) indicate a degree of co-relationship between the drivers of customer satisfaction. They tested six propositions of which only four were considered to be supportive, after carrying out the multivariate analysis. Maddern et al. (2007) did not study the interrelationship among the drivers of customer satisfaction. This PhD thesis therefore extends their analysis and, apart from investigating the link between drivers of customer satisfaction, it also investigates their interrelationship. As a result, in this case study three main propositions are being investigated. The first two propositions derive from Maddern et al. (2007) with a new proposition added to explore causality among the operations performance indicators.

The first proposition tests the relationship suggested in SERVQUAL literature i.e. the relationship between customer satisfaction and quality construct,

*P1: Customer Satisfaction is positively correlated with Quality*



The next proposition, P2, will examine the link between dependability and customer satisfaction,

*P2: Dependable service leads to satisfied customers i.e. Customer Satisfaction is positively correlated with Dependability*

Additionally, the third proposition argues that operations performance indicators do not act in isolation but affect and are affected by each other,

*P3: Dependability and Quality are positively correlated*

The next section details the methods for data collection employed in this case study.

### **5.1.3 Data Collection**

This study uses the secondary time series data set provided by the firm over a period of five years (2000-2004). A series of meetings was held with the retail bank representatives to discuss the possibility of sharing the available data resources and careful consideration was given while operationalizing the key constructs i.e. quality, dependability and customer satisfaction. However, as is the case with most of the data sets, the frequency, sample size etc. varied over time for different constructs. To maximise the useable data and at the same time to ensure consistency, a framework was created based on quarterly performance over a five-year period from January 2000, to December 2004. These data sets were collected by the firm through a third party data collection agency. The data collection agency applied the collection and analysis protocols consistently over a five-year period from January 2000 to December 2004. The collected monthly data set was based on the results of around 15,000 telephone interviews with customers. All customers were asked five questions:

1. Overall, how satisfied are you with the company?
2. To what extent do staffs understand your needs?
3. How easy is it for you to contact us?
4. To what extent do you feel we are putting your interests first?
5. Does a member of staff have the expertise to do the best possible job for you?

The responses to these questions were measured on a five point Likert scale (where, 1: did not... 2...; 5: fully met). Results were analysed to provide a monthly score for each item within the range 0-100. The data was generated for each construct from the given secondary data set and is explained in more detail in the next section. Before the data analysis for all the five cases certain assumptions were justified such as data is normally distributed, no multicollinearity exists, there is a linear relationship between the variables and no outliers are present in the data set.

#### **5.1.4 Operationalization of Key Constructs**

In this case study the three variables (dependability, quality and customer satisfaction) were studied. The data for all the constructs was collected through a telephone survey. The operationalization of the constructs is described below:

##### **Customer Satisfaction**

In this case study, to operationalize the 'Customer Satisfaction' construct, a single item measure was used which is consistent with the approach taken by Voss et al. (2004). The data for this single item measure was calculated from the secondary data provided by the firm, where customers were asked about their level of satisfaction with the firm;

Overall, how satisfied are you with the company?

The monthly scores for customer satisfaction were collected throughout the 5 years (2000-2004). These monthly scores were then converted to quarterly scores using the mean of the monthly scores for the purpose of analysis. The sample of the data is presented in Appendix D.

##### **Quality**

Operationalizing 'quality' in service firms is difficult, a fact highlighted by Kang and James (2004). The difficulty arises because service quality is often separated into two dimensions, functional and technical service quality (Grönroos, 1984). Many researchers have operationalized this construct using the SERVQUAL measure (Richard and Allaway, 1993; Parasuraman et al.1985; Powpaka, 1996; Bloemer et al., 1999). As pointed out earlier however all five dimensions of SERVQUAL do not completely align with functional service quality (FSQ) as the two items 'tangibles' and

'reliability' deal mainly with the outcome of service i.e. technical service quality (TSQ). Although the firm did not employ the SERVQUAL scale to measure the 'quality' construct, the four questions asked during the survey closely relate to some of the SERVQUAL dimensions (Taylor and Cronin, 1994; Taner and Antony, 2006).

Q1. To what extent do members of staff understand your needs?

This question dealt with the staff's understanding of customer needs which aligns with the 'assurance' item of the SERVQUAL scale (Taner and Antony 2006).

Q2. How easy is it for you to contact us?

Q3. To what extent do you feel we are putting your interests first?

Q4. Do members of staff have the expertise to do the best possible job for you?

Questions 2-4 align with the accessibility, credibility (trust) and assurance items of the SERVQUAL scale (Woodside et al. 1989; Taylor and Cronin, 1994; Antony et al. 2004; Taner and Antony, 2006). The work of Armistead (1990) and Lassar et al. (2000), who measure soft quality comprising competence, accessibility, availability, responsiveness and trustworthiness also supports these measures.

The 'quality' construct operationalized as the sum of the four questions and was calculated as the mean of the average monthly score. The monthly data for quality construct was also converted to quarterly scores for the purpose of analysis. The sample of the quality data is presented in Appendix D.

### **Dependability**

Dependability is defined as a firm's ability to perform the promised service dependably and accurately, including the time commitments. In this case study dependability is measured in terms of the firm's service level agreements (SLA) with the customers, regarding the contracted delivery time (of the service).

The data consisted of the quarterly percentage of the service level agreements (%SLA) with the customers for a 36 months time frame (2002-2004). The data for Q4 in 2004 was missing from the original data sheet and therefore was adjusted to the average mean

value. The service level agreement data is shown in Appendix E. The next section examines the research findings.

### 5.1.5 Research Findings

First, a descriptive analysis (Table 5.2) was run on the data set which was composed of quarterly results from Q1 2000 to Q4 2004 as shown in Table 5.3. Afterwards correlation analysis was performed and the outcome of the analysis is shown in Figure 5.2. To determine the normal distribution of the data normality test was performed. The ‘Kolmogorov-Smirnov’ and ‘Shapiro-Wilk’ tests of normality confirmed that the data is normally distributed.

**Table 5.2: Descriptive Statistics for case study I**

	N	Minimum	Maximum	Mean	Std. Deviation
Quality	20	60.36	62.48	61.2790	.60596
SLA (Dependability)	12	.60	.93	.8039	.10851
CS	20	65.53	68.10	66.9100	.76881
Valid N (list wise)	12				

**Table 5.3: Quarterly Data Set from 2000Q1 – 2004 Q4**

	Customer Satisfaction	Quality	Service Level Agreement (Dependability)
2000-Q1	66.00	61.50	0.00
2000-Q2	66.33	61.11	0.00
2000-Q3	66.55	62.06	0.00
2000-Q4	67.30	62.48	0.00
2001-Q1	67.27	62.35	0.00
2001-Q2	65.97	60.93	0.00
2001-Q3	65.77	60.71	0.00
2001-Q4	65.53	60.36	0.00
2002-Q1	66.33	61.35	0.60
2002-Q2	67.17	61.97	0.66
2002-Q3	66.43	60.79	0.70
2002-Q4	66.73	61.12	0.77
2003-Q1	67.03	61.30	0.79
2003-Q2	67.40	61.72	0.74

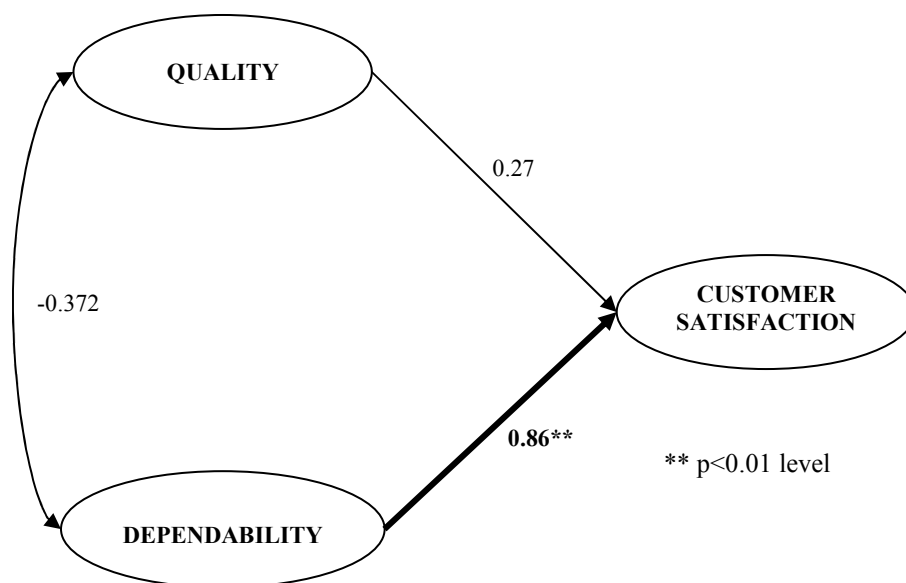
2003-Q3	67.33	60.68	0.85
2003-Q4	67.30	60.61	0.85
2004-Q1	67.93	61.08	0.92
2004-Q2	67.73	60.89	0.90
2004-Q3	68.10	61.77	0.92
2004-Q4	68.00	60.80	0.92

The correlation analysis reveals a significant correlation (0.86) between dependability and customer satisfaction at  $p < 0.01$  level. P-value is interpreted as the probability of the occurrence of a given event thus, it provides a level of significance at which null hypothesis will be rejected. In this case, p-value is  $< 0.01$  level, thus rejecting the null hypothesis that there is no effect between dependability and customer satisfaction and suggesting a significant correlation between these two variables. The rest of the correlations were found to be insignificant. The quality and customer satisfaction link was found to be positive whereas dependability and quality showed a negative correlation. Therefore, the correlation analysis provided support for the first two propositions:

*P1: Customer satisfaction is positively correlated with Quality*

*P2: Customer satisfaction is positively correlated with Dependability*

However, correlation analysis results did not support proposition P3 i.e.



**Figure 5.2: Correlation Analysis result of Case Study I**

*P3: Dependability and quality are positively correlated*

To verify further the findings a series of regression analysis was run on the secondary data set. Since correlation analysis provides support for propositions 1 and 2 therefore, regression equation was first examined to verify these findings. The regression analysis shows that altogether these two elements explain around 86.7% (Adjusted R<sup>2</sup> value) of the variance. ANOVA analysis further verified this finding as the mean was significant at 1% level. The results of the analysis are shown in Table 5.4.

A further series of regressions was carried out where individual elements were regressed against customer satisfaction. The regressions verified the finding of the correlation analysis which indicates that dependability and customer satisfaction are significantly correlated. The result shows that dependability, on its own, explains around 71.1% (Adjusted R<sup>2</sup> value) of the variance and the coefficient was also found to be significant (0.000) (Table 5.5) at 1% level. Regression further indicates that quality on its own explains just 2% (Adjusted R<sup>2</sup> value) of the variance and the beta coefficient was also insignificant (0.25). One possible explanation for this finding is that, when examining individually, there exists a large error term (since 98% of variance remains unexplained) but, altogether the two operational performance indicators reduce the error term and result in explaining around nearly 86.7% of the variance. Nevertheless, the regression analysis failed to provide any supporting evidence for the third proposition i.e. that a positive relationship exists between dependability and quality. Correlation analysis just shows the direct effect of each indicator on customer satisfaction though; both indicators also affect customer satisfaction indirectly. Moreover, correlation does not show the causality; therefore the total effect (direct effect + indirect effect) and causality among measures will be investigated using Path Analysis method in the third phase of the analysis. The regression analysis highlights that dependability is a crucial indicator for achieving customer satisfaction. It therefore shows in this case study the relative significance of dependability over quality.

The findings provide an understanding of the link between operations performance indicators and customer satisfaction in B2C information intensive service settings. One should keep in mind however that the finding does not imply that quality is unimportant rather that it suggests that information intensive firms should focus on improving their processes to meet the promises made to customers, i.e. provide dependable services.

The negative correlation between quality and dependability directs attention towards the ‘trade-off’ theory (Ferdows and De Meyer, 1990) which insists that improvement in one capability comes at the expense of the other. This interrelationship is further discussed in the data analysis chapters. The significant relationship between dependability and customer satisfaction points out that for information intensive firm’s dependability is a crucial factor. The next section will investigate the second case study taken from a Utility Firm.

	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	29.329	9.623		3.048	.014
Quality	.548	.154	.422	3.559	.006
Dependability	5.527	.645	1.016	8.565	.000
Adjusted R <sup>2</sup> = 0.867; Dependent Variable: Customer Satisfaction					

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	63.534	.715		88.896	.000
Dependability	4.672	.882	.859	5.300	.000
Adjusted R <sup>2</sup> = 0.711; Dependent Variable: Customer Satisfaction					

## 5.2 Case Study II

Case Study II is taken from a different B2C information intensive service firm operating in the UK. The aim of this case study is to further test the findings of the first B2C case study. The data was available for the two operations performance indicators quality, dependability and customer satisfaction as in Case Study I. The discussion on the data

collection method is presented later in upcoming section. The next section provides an overview of the Utility firm.

### **5.2.1 Overview of B2C Network Utility Branch**

The case study II is taken from a network branch of a large utility firm, 'U', operating in the UK. B2C network branch provides services to domestic customers. This specialist division distributes power to around 2.2 million customers, and connects new buildings and infrastructure to the power networks. B2C network branch is responsible for transporting electricity to homes and restores power supply in cases of network failure. Altogether the network branch covers around 170,000 kilometres of underground cables and overhead lines with 66,300 sub-stations. This branch also builds major partnerships to deliver long-term infrastructure projects, primarily in the public sector.

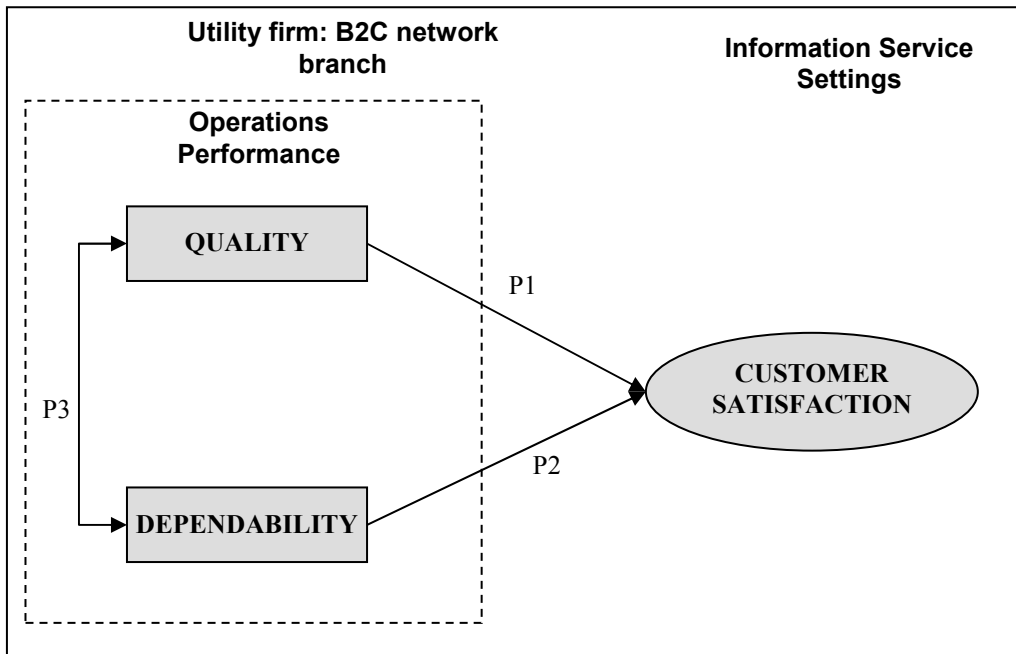
In the last fiscal year the firm reported decreased earnings before interest, tax and depreciation, of 1.6%, from £219.8m (2008) to £216.3m (2009). The annual turnover (cost of sales) however, increased from £309.9m (2008) to £348.6m (2009) while gross profit increased from £297.9m (2008) to £330.4m (2009). The overall profit of the firm increased marginally from £99m to £101.6m.

The firm measures and collects data through various data collection agencies to monitor its performance over time. The data set for a 24 months time frame (2006-2007) was made available for this research. The next section details the research objectives for this case study.

### **5.2.2 Research Objective**

The research question aims to explore the relationship between operations performance and customer satisfaction in B2C information service firms. The objective of this second case study is to test further the findings of the first B2C case study. If the outcome of this case study validates the finding of the first case, it will provide strong support for the generalization of the findings for B2C information service firms. Thus, the research objectives and the theoretical framework model are the same for this case study, as shown in Figure 5.3. Case study II also aims to investigate three propositions.





**Figure 5.3: Research Framework for Case Study II**

The first proposition aims to test the relationship between customer satisfaction and quality i.e.

*P1: Customer satisfaction is positively correlated with Quality*

The second proposition, also considered in Case study I, aims to investigate the relationship between dependability and customer satisfaction. The strength of the relationship of this proposition will show that dependability is relatively more important for B2C information intensive firms.

*P2: Customer satisfaction is positively correlated with Dependability*

Finally, the third proposition aims to investigate the interrelationship between dependability and quality, i.e.

*P3: Dependability and Quality are positively correlated*

The next section explains the data collection method used for the three cases studied in this chapter.

### **5.2.3 Data Collection**

The secondary longitudinal time series data set for this case was available for a two year (2006-2007) time frame. The data comprised monthly measurements of variables operationalized as quality, dependability and customer satisfaction. The longitudinal time series data set was collected by the data collection agencies on behalf of the firm over telephonic interviews and in writing. Customers were asked a number of questions to gain their perspective on the firm's level of service quality, delivery, dependability and satisfaction with the overall services provided by the firm. The reliability and validity issues were also justified. The operationalization of the key constructs for case study II is discussed in the next section.

### **5.2.4 Operationalization of key constructs**

The data for this case study involved measures on two operations performance indicators (dependability and quality) and customer satisfaction. The data set is shown in Appendix (F). The operationalization of the three constructs is discussed below;

#### **Dependability**

In case study II, in order to operationalize the dependability construct, a single scale item was used with the understanding that dependability means fulfilling promises including time commitment (Raajpoot, 2004; Slack et al., 2004; Taner and Antony, 2006). Customers were asked to rate their opinion on timely completion of the promised work, i.e.

My work was completed on time

The monthly data set was collected on Likert 10 point scale from 1 = strongly disagree and 10 = strongly agree. The data set was converted into monthly percentage data for consistency in calculation across cases for the duration of 2006-2007.

#### **Quality**

In this case study quality was measured on a multi-scale item which resembles with the some items of the SERVQUAL scale (Armistead, 1990; Parasuraman et al. 1985; Bloemer Bloemer, Ruyter and and Wetzels, 1999, Taner and Antony, 2006). However,

the firm did not employ the SERVQUAL scale while measuring quality. Customers were asked to give their opinion on the following three statements;

1. Staff members were polite and helpful

The first question concerns the helpful attitude of staff members towards customers that align with the 'Responsiveness' item of the SERVQUAL scale (Parasuraman et al., 1991; Stank et al., 1999; Antony et al., 2004; Taner and Antony, 2006).

2. Staff members were able to provide sufficient information about the problem

The second question evaluates the expertise and knowledge of the staff personnel in handling customer queries i.e. 'Assurance' dimension of the SERVQUAL scale

3. It was easy to contact us to find out about the problem

The third question refers to the ease of contact and belongs to the 'Access' dimension of the SERVQUAL scale (Zeithaml et al., 1990; Lassar et al., 2000; Taner and Antony, 2006) i.e. approachable and easy of contact.

These dimensions have been well acknowledged by researchers (Armistead, 1990; Lassar et al., 2000; Taner and Antony, 2006). The scores were converted into monthly percentage data for consistency. The data was also converted to single scale item since the Cronbach's Alpha value was found to be 0.91 ( $>.70$ ) as shown below. George and Mallery (2003:231) provided a thumb rule to interpret Cronbach's Alpha values which explains that values  $>.90$  is excellent;  $>.80$  is good;  $>.70$  is acceptable;  $>.60$  is questionable;  $>.5$  is poor and  $<.50$  is unacceptable.

<b>Reliability Statistics For Quality Constructs</b>	
Cronbach's Alpha	N of Items
.905	3

## Customer Satisfaction

Customer satisfaction construct was operationalized as a single item measure. Customers were asked about their overall satisfaction with the level of services provided, i.e.

Overall how satisfied are you with the level of service?

All the three constructs have now been operationalized so the next section will discuss the research findings.

### 5.2.5 Research findings

The data was first subjected to descriptive analysis, the outcome of which is presented in Table 5.6. The normality tests were performed for the data set and the ‘Kolmogorov-Smirnov’ and ‘Shapiro-Wilk’ tests of normality confirmed that the data is normally distributed. Thereafter, correlation analysis was run on the available data set (Figure 5.4). The correlation analysis shows a strong and positive correlation (0.88) between dependability and customer satisfaction at  $p < 0.01$  level. This finding is in line with the findings of the case study I wherein dependability is a key performance indicator. Therefore, the outcome here supports the finding of the first case study, i.e. (P2)

*P2: Customer satisfaction is positively correlated with Dependability*

	N	Minimum	Maximum	Mean	Std. Deviation
Quality	23	193.22	255.65	219.5434	17.73813
Dependability	23	59.79	77.40	73.6106	4.52139
Customer Satisfaction	23	54.64	75.60	68.7888	5.44080
Valid N (listwise)	23				

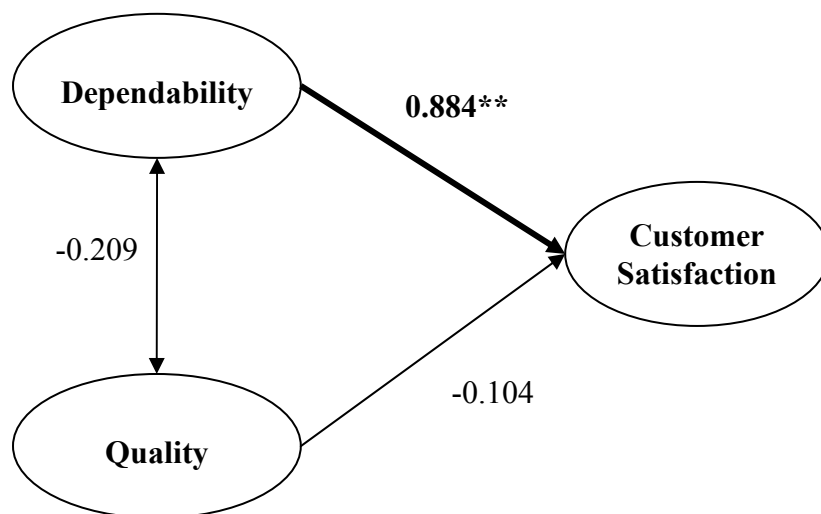
However, apart from the strong relationship between dependability and customer satisfaction, the remaining correlations were found to be insignificant and do not provide support to proposition 1 (P1) and 3 (P3), i.e.

*P1: Customer satisfaction is positively correlated with Quality*

*P3: Dependability and Quality are positively correlated*

Although, the findings from this case study show that dependability and quality are negatively correlated, supporting the finding of Case Study I.

Therefore, this result also points toward the direction of ‘trade-off theory’ which argues that improvement in one generic capability is possible only at the expense of the other (Ferdows and De Meyer, 1990). However, the correlations are not significant and need further investigation. This relationship will be further explored using the Path Analysis method later in this thesis.



\*\* Correlation is significant at the 0.01 level (2-tailed).

**Figure 5.4: Correlation analysis result of Case Study II**

**Table 5.7: Regression result for Quality, Dependability and Customer Satisfaction**

	Unstandardized		Standardized		Sig.
	Coefficients		Coefficients	t	
	B	Std. Error	Beta		
(Constant)	-16.681	12.861		-1.297	.209
Quality	.026	.032	.084	.796	.436
Dependability	1.084	.127	.901	8.552	.000

Adjusted R<sup>2</sup> = 0.766; Dependent Variable: Customer Satisfaction

Regressions were performed to verify the findings of the correlation analysis. Regression shows that quality and dependability in total explain around 76.6% (Adj. R<sup>2</sup> value) of the unexplained variance. However, only the dependability coefficient was found to be significant at 1% level (Table 5.7). Therefore, further regression was run between dependability and customer satisfaction to explore this relationship and the outcome shows that dependability alone explains around 77% (Adj. R<sup>2</sup> value) of the variance. This provides strong supporting evidence to the previous finding that dependability is more crucial for achieving customer satisfaction than quality in B2C information service settings. Later in this thesis the outcome of the case study findings will be subjected to further investigation using Path Analysis method.

The case study II supports the findings of the previous B2C case which argues that dependability is a prime indicator of customer satisfaction. Moreover, both studies point towards a negative link between dependability and quality and thus provide strong support for the generalization of the research outcomes in B2C information service settings. Both B2C case studies addressed the first research objective to investigate the linkage between operations performance and customer satisfaction. Performance outcome consists of customer satisfaction and customer loyalty (Fornell, 1992; Anderson and Sullivan, 1993; Stank et al., 1999). Since the links between operations performance and customer satisfaction have been verified in B2C service firms it would be worthwhile to investigate the link between operations performance and customer loyalty. The next section will investigate this link in another case study taken from a different B2C information intensive firm.

## **5.3 Case Study III**

The first two B2C case studies addressed the first research questions that aim to probe the link between operations performance indicators (dependability and quality) and customer satisfaction. Case study III extends the previous two cases as it will investigate the link between operational performance indicators and customer loyalty. This case also includes an additional operations performance element, 'delivery speed', together with quality and dependability. This is a case study of a broadband installation service, provided by one of the largest telecommunication firms operating in the UK. The brief overview of the firm is presented in the next section.

### **5.3.1 Overview of the firm: Telecommunication Firm**

This case study is based on the data collected from a large telecommunication firm referred to as firm 'ABC' due to a confidentiality agreement with the firm. In this research the data for the broadband installation process is collected. The broadband service offered by the firm is the most popular service in the UK. The firm's broadband network covers about 99% of UK households. Firm ABC is also the only nationwide company to make its network available on a national basis for others to provide services to customers.

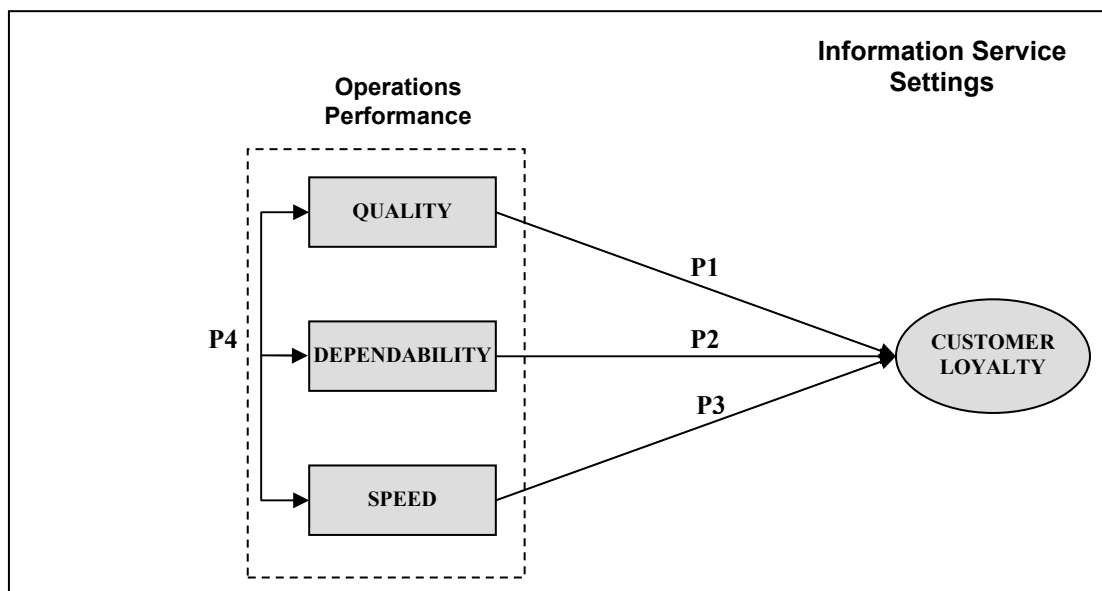
The 2009 annual report published by the parent firm 'ABC' shows that the ABC retail performed well even in the economic downturn. The firm was very successful in reducing costs and improving customer service. The broadband and convergence revenue of the firm grew by 9% in 2009. Additionally, the broadband-installed base increased by 355k to 4.8 million customers. Gross profit also increased about 2% and gross profit margin increased by 0.9% to 38% in 2009 despite economic difficulties the firm's operating profit also improved by 15% to £1,209m in 2009. These statistics show that the firm is progressing well in providing broadband services as it covers a majority of the population in the UK.

The firm monitors its own performance and customer opinion by carrying out surveys of their products and services. The company tracks key measures in the consumer market, including broadband take-up, mobile phone usage and increase in telecom

services. It also measures quality, customer satisfaction and other related issues through face questionnaires and telephonic interviews on a monthly basis. This firm provided an opportunity to investigate the research questions in another B2C information processing firm. The detailed discussion on the data collection methods and explanation of the constructs are provided later in the upcoming sections. The next section will discuss the literature to highlight the relevant theory underpinning this research.

### 5.3.2 Research Objective

Customer retention has become a major issue for organisations in the current financial turmoil. Ittner and Larcker (1998) in their study found that customer retention results in improved financial performance. This notion has also been supported in the work of Ennew (2003) and Weinstein (2002). Anderson et al. (1994) stated that customer retention is an inherent outcome of customer loyalty. Reichheld and Sasser (1990), also show in their study that enhanced customer loyalty results in increased revenue, increased market share, reduced customer acquisition costs, and overall profitability. These studies underline that customer loyalty is of prime importance for the firms. It is therefore worthwhile to investigate the operations performance and customer loyalty link.



**Figure 5.5: Theoretical Research Framework for Case Study III**

This research builds upon previous research by testing a model which comprises three operations performance indicators and their effects on customer loyalty. Besides dependability, which is an operations element of prominent importance in service



quality studies (Zeithaml et al., 1990; Parasuraman, 1991; Berry, 1995), the model brings together two other operations elements which were analysed in previous studies: waiting time (Bielen and Demoulin, 2007), which can be regarded as a proxy for delivery ‘speed’, and multi-item measures for quality. These operations performance elements provide the basis for the framework below (Figure 5.5), which was used to generate the propositions for empirical testing.

In the framework, operations performance of service delivery comprises three critical performance indicators (quality, dependability, and speed) that are usually present in a service delivery system. Consistent quality, dependability of delivery, and prompt delivery (speed) are critical operations performance indicators in service delivery systems. The literature linking these individual operational indicators and customer loyalty through mediating variable customer satisfaction is available in abundance (Anderson et al., 1994; Heskett et al., 1994; Bloemer, Ruyter and Wetzels, 1999; Stank et al., 1999; Zhang et al., 2003; Bielen and Demoulin, 2007; Lai and Yang 2009). However studies that investigate the direct effect of operations performance and customer loyalty are not available. Recognising this research gap this thesis examines the direct link between the operational performance indicators and customer loyalty. The propositions derived from the framework reflect key relationships that were described in the literature review. This case study tests four prepositions to find answers to the research questions.

The first three propositions (P1, P2, and P3) in the framework refer to the impact of operations performance elements on customer loyalty. Considering that the operations elements in the framework shown in Figure 5.5 (quality, dependability, and speed) are critical performance objectives, this research hypothesises that, when the performance of critical operations elements in a service delivery system is negatively affected, there will be a negative impact on customer loyalty. Proposition P1, P2 and P3 are stated as follow:

*P1: Customer Loyalty is positively correlated with Quality*

*P2: Customer Loyalty is positively correlated with Dependability*

*P3: Customer Loyalty is positively correlated with Speed*

The fourth proposition (P4) takes into account that the elements of the operations performance do not act in an isolated manner. In a service delivery system different activities are grouped together to perform specific operations processes. Although specific processes have particular objectives, they all are components or elements of the same service delivery system. Once a service is ordered a series of organisational processes are set in motion so that the customer can promptly get what he/ she ordered. The overall performance of the delivery system as a whole is the outcome of the specific performance of its constituent processes. From the aspects mentioned thus far, this thesis hypothesises that an interrelationship exists among the operations performance indicators. Proposition P4 is therefore stated as:

*P4: An interrelationship exists between the operations performance indicators (dependability, quality and speed)*

The investigation of this proposition will also lead to an understanding of the interrelationships between operations performance indicators. The next section outlines the data collection method.

### **5.3.3 Data Collection**

The data in this study comprised monthly measurements of the variables (speed, quality, dependability, and customer loyalty) for a four-year time frame (from 2003 to 2006), collected for the broadband installation service by the data collection agencies. The operationalization of the key constructs is detailed in the next section. Appendix G shows the snap shot of arrival at first promise (proxy for dependability), average lead time (proxy for speed) and likelihood of recommendation (proxy for loyalty) data. Appendix H shows the data for the quality construct. As is the case with most secondary data sets, data was unavailable for certain constructs for the entire four year duration. Therefore, careful consideration was given, while analysing the data, to avoid any bias in the outcome such as the constructs were operationalized with supporting evidences from literature and missing data points were not filled with the mean values.

The secondary data was collected by the firm through telephonic surveys on customers' perception of the firm. Customers were asked a series of questions to gain overall

insight of their view on several aspects, such as the firm's image, quality of service provided, trust, satisfaction, dependability and likelihood of recommendation.

### **5.3.4 Operationalization of Key Constructs**

In this case study in total four variables (dependability, quality, speed and customer loyalty) were measured. The operationalizations of key constructs are given below:

#### **Dependability**

Dependability is conceptualized as the ability to perform the promised service dependably and accurately (Raajpoot, 2004; Slack et al., 2004; Taner and Antony, 2006). It means fulfilling promises, including time commitment, so the proxy variable for 'dependability' in this case is 'arrival on first promise' i.e.

Whether the products were delivered by the promised time?

Keeping delivery promises made to customers represents an organisational ability to deliver dependable services. In this sense, low measurements for 'arrival on first promise' suggest low dependability performance and, conversely, high 'arrival on first promise' means high dependability. The monthly data was collected on a 10 point scale where 1= poor and 10 = excellent

#### **Quality**

The firm measured 'Quality' construct on a multi-scale basis that closely resembles the SERVQUAL dimensions. Although the firm 'ABC' did not employ the SERVQUAL scale to measure the quality construct, they collected monthly data on 5 core aspirations/values (Helpful, Trustworthy, Inspiring, Straightforward and Heart). These aspirations or values are theoretically very closely linked with the SERVQUAL measures supported by many researchers (Parasuraman, 1985; Powpaka, 1996; Bloemer, Ruyter and and Wetzels, 1999; Antony et al., 2004; Taner and Antony, 2006). Customers were asked five questions on the five core aspirations of the firm:

- Do you feel staff members were helpful?
- To what extent do you feel we take care of your needs?

The first two questions refer to the ‘Empathy’ item of the SERVQUAL scale which reveals the caring attitude of the staff members and the individual attention provided to customers.

- How convenient was it to deal with us?

This question refers to the ‘Access’ item on the SERVQUAL scale which shows the approachability of the staff and ease in contacting the service provider.

- Do staff members provide a sense of trust/security?
- Do you feel we have a favourable attitude towards our customers?

These two questions closely equate to the ‘Assurance’ item of the scale which shows the ability of staff to inspire confidence and trust (Parasuraman et. al., 1988; 1991).

These elements have also been covered in the studies of Woodside et al. (1989), Taylor and Cronin (1994), Taner and Antony (2006) and others. The monthly data set was collected on the Likert 10 point scale, as explained earlier. The data was converted into single item scale as all the measures of the ‘quality’ construct strongly correlated with each other and the reliability test result showed good Cronbach’s Alpha value of 0.79 (>.70) (George and Mallery, 2003:231) as shown below. Therefore, the measures on all 5 items were added together to form a single scale item for the ‘quality’ construct.

<b>Reliability Statistics</b>	
Cronbach's Alpha	N of Items
.790	5

### **Speed**

The firm collected data on the ‘average lead time’ quoted to customers, which is the average number of days the company needs to effectively deliver a customer’s order. This was considered as a proxy for ‘speed’. From a customer perspective, this is a ‘waiting time’ element, i.e. the number of days a customer has to wait to have the broadband installed. Hence, when analysing the speed factor for the company one must bear in mind that ‘high lead time’ means ‘slower speed’ and, conversely, ‘lower lead time’ means ‘high speed’.

### **Customer Loyalty**

The customer loyalty data was collected as a part of the Net Promoter Index (NPI) project by the firm. NPI is both a loyalty metric and a discipline for using customer feedback for profitable growth. A firm therefore uses the NPI to measure the loyalty of its customer relationships (Morgan and Rego, 2006; Zeithaml et al., 2006; Keiningham et al., 2007). The Net Promoter Score is measured in terms of the likelihood of a recommendation of the service provider to a friend or others and is measured on a 0 to 10 rating scale. Therefore, the firm asked their customers the following question to measure the NPI score.

Overall how likely would you be to recommend firm 'ABC' to friends or family?

The data was measured using a 10 point Likert scale where 1 = not at all likely and 10 = very likely. The proxy variable for loyalty is the likelihood of a recommendation of the service to third parties. In the study, loyalty is an average measure of the extent to which customers are 'extremely likely' or 'very likely' to recommend the service provider. According to Dick and Basu (1994), truly loyal customers are the ones who, besides developing preferential attitudes towards the selling firm, motivate others to seek the services provided by the firm, through recommendation or positive word-of-mouth. The next section outlines the research findings of this case research.

### **5.3.5 Research Findings**

First descriptive analysis (Table 5.8) was run on the secondary data set and mean scores and standard deviations for the constructs were measured. The data thereafter was subjected to correlation analysis. The analysis points out that a significant ( $p < 0.05$ ) and positive correlation (0.53) exist between the 'dependability' and the 'customer loyalty'. 'Dependability' was also found significantly ( $p < 0.01$ ) and negatively correlated with the average lead time i.e. 'speed'. Other correlations were insignificant. The correlation analysis outcomes are presented in Figure 5.6.

Table 5.8: Descriptive Statistics for Case Study II					
	N	Minimum	Maximum	Mean	Std. Deviation
Dependability	31	77.0	88.3	82.945	3.0846
Quality	22	31.56	32.88	32.3341	.31392
Speed	24	13.0	32.7	19.487	4.7410
Customer Loyalty	30	16.1	34.3	26.367	5.3985
Valid N (listwise)	4				

The correlation analysis shows dependability ('arrival on first promise') has a moderate and positive relationship (0.53) with customer loyalty (Johnston, 2000). Dependability ('arrival on first promise') also has a positive relationship with the 'quality' construct. Quality and customer loyalty correlation was found to be positive although insignificant. However, correlation analysis indicates that there is an inverse relationship between dependability and speed (average lead time). The negative relationship of 'speed' with 'quality' and 'customer loyalty' suggests that increasing lead time has a negative impact on quality and customer loyalty.

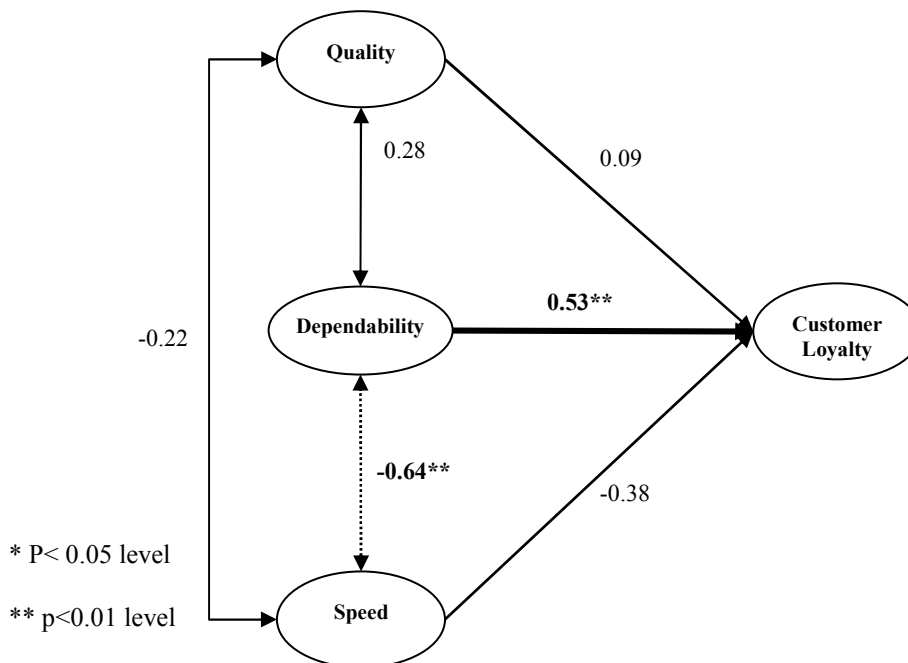


Figure 5.6: Correlation Analysis result of Case Study III

Therefore, correlation analysis provides support for Preposition P1 and P2,

*P1: Customer Loyalty is positively correlated with Quality*

*P2: Customer Loyalty is positively correlated with Dependability*

The correlation analysis does not support P3 as a negative correlation was found between speed and customer loyalty.

*P3: Customer Loyalty is positively correlated with Speed*

Although correlation supports proposition P2 and fails to support proposition P3, the insignificant correlations demand further investigation. The outcome shows that 'quality' and 'dependability' have a direct and positive relationship with customer loyalty. There is a moderate and positive correlation moreover between 'dependability' and customer loyalty thus pointing out that dependability is an important driver of customer loyalty. This also indicates that performing well on providing dependable services has a positive impact on customers and results in 'positive word of mouth'. 'Average lead time' (proxy for speed) is negatively correlated with 'customer loyalty' which suggests that slower delivery speed negatively impacts on customers intentions regarding repurchase. However, these relationships need to be further verified before reaching any conclusions.

The correlation analysis also provides support for Proposition P4

*P2: An interrelationship exists between the operations performance indicators (dependability, quality and speed)*

The outcome of the correlation analysis shows that variations in 'dependability' impact directly on 'quality' and 'speed'. While interpreting results and discussing 'speed' measure, one should bear in mind that, in this study, high 'lead time' means slower speed and, conversely, low 'lead time' means high speed. The outcome suggests that poor dependability may impact negatively on quality and speed performance elements. This supports proposition P4. The evidence also indicates that dependability has stronger influence over the other two performance elements studied. This finding is in accordance with, and extends the conclusions of, previous studies which showed that dependability is an operations performance indicator of serious importance (Zeithaml et al., 1990; Berry, 1995; Stank et al., 1999).

To verify further the key findings of the correlation analysis a series of regressions was run on the secondary data set. Correlation analysis shows that dependability emerged as a key indicator affecting customer loyalty. To verify the strength of this relationship in regressions, dependability was used as a predictor and the result is shown below in Table 5.9. Although the regression result reveals that dependability explains only around 25.4 % (Adj.  $R^2$  value) of the variance, the coefficient was found to be significant. The low value of the adjusted  $R^2$  suggests that either the variable alone is not capable of explaining the variance and some other variables are missing in the analysis or there is a large residual standard deviation. However, the ANOVA analysis showed that dependability is a significant driver of customer loyalty, since means were significant (0.003) at  $p < 0.01$  level.

	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	-51.716	23.693		-2.183	.038
Dependability	.940	.285	.529	3.298	.003
Adjusted $R^2 = 0.254$ ; Dependent Variable: Customer Loyalty					

Regression analysis (Table 5.10) further indicates that speed explains around 38% (Adj.  $R^2$  value) of the variance. Again the lower value of adjusted  $R^2$  suggests that speed on its own is not able to explain the large amount of the variance in dependability and there might be a large residual standard deviation in the data. This demands further investigation of the relationship between these two variables and this will be tested in the next chapter using Path Analysis method. ANOVA analysis coefficient in this case was found to be significant (0.001) at  $p < 0.01$  level. This implies that there is a strong interrelationship between these two elements of operations performance. However, regression coefficient was found to be insignificant between dependability and quality, and between quality and speed. Nevertheless, dependability and quality had a positive relationship whereas average lead time, the proxy for 'speed' and 'quality' had a negative relationship. Hence this suggests that when a firm provides dependable services, the quality of the service provided goes up and when the delivery speed is low, the quality is likely to fall as well. As in the previous case study the interrelationship



among the operations performance indicators will be explored in more detail using Path Model Analysis in Chapter 7.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	B	Std. Error
(Constant)	89.137	1.901		46.887	.000
Speed (Avg, LT)	-.369	.095	-.638	-3.884	.001
Adjusted R <sup>2</sup> = 0.38; Dependent Variable: Dependability					

Correlation and regression analysis show that a positive relationship exists between dependability, quality and customer loyalty. This suggests that these two operations performance indicators actually contribute to building long-term relationships with customers. A strong and negative correlation between dependability and speed highlights the trade-off between these two operations performance indicators. Dependability emerges as a key driver of loyalty whereas the negative relationship of speed with customer loyalty points out that ‘lead time’ probably is, in practice, an order-winning yardstick (Hill, 2005), setting customers’ expectations for the delivery time, so failing to deliver product on time affects customer loyalty. The other two variables (‘dependability’ and ‘quality’) are post-sale attributes. This implies that it is the post-sales operational performance which more strongly affects loyalty, not those attributes which help contribute to the sale. The implications for companies of this aspect are considerable. The next section summarises this chapter.

## 5.4 Summary and Conclusions

This chapter analyses three case studies to explore the relationship between operations performance, customer satisfaction and customer loyalty in B2C information service settings. The first case study was taken from a large retail bank firm operating in the UK for which longitudinal time series secondary data of around four years was available. The analysis of the data showed that dependability is a key driver of customer satisfaction. Case study I further investigated the relative impact of dependability and

quality and shows that for B2C information service a firm's dependability is more important as opposed to SERVQUAL literature findings, where traditional priority is afforded to quality. The data analysis additionally showed that a negative relationship exists between dependability and quality suggesting that improvement in one is only possible at the expense of the other, thus pointing towards the 'trade-off' theory.

The second case study taken from another B2C information intensive service firm, i.e. a utility firm, was aimed at testing the findings of the first B2C case study. The set of propositions used for the 'Case Study I' was re-tested in Case Study II. The outcome from Case Study II showed a strong and positive correlation between dependability and customer satisfaction. Case Study II also showed that dependability is a crucial indicator of customer satisfaction for B2C information service firms. Moreover, a negative correlation between dependability and quality was also evident in Case Study II. This further showed that the traditional 'trade-off' theory' prevails in the B2C information service firms.

The third case study was taken from a large UK telecommunication firm. The aim of the Case Study III was to investigate the direct impact of operations performance indicators (dependability, quality and speed) on customer loyalty in B2C information service firms. The analysis shows that dependability is a key driver of customer loyalty and thus highlights the relative significance of dependability over quality in B2C information service settings. The findings showed furthermore that speed is a pre-sale attribute and thus acts as a criterion for winning orders. The other two operational factors (dependability and quality) are post-sales attributes which, in the long run, affect customer retention.

The first objective of this thesis is to investigate the relationship between operations performance and customer satisfaction. Case Study I show that there is a strong link between these measures. The intensity or strength of the relationship among them are not the same. This was further verified by the analysis of Case Study II. The second research objective was aimed at investigating the link between operations performance and customer loyalty. The outcome of Case Study III showed that quality and dependability affect customer loyalty. This study therefore supplements the literature about operations performance indicators impacting directly on customer loyalty. The

result also shows that although quality is important, it is dependability that significantly affects customer satisfaction and customer loyalty.

The other objective of this research was to investigate the interrelationship among the operational performance indicators. Case research shows that these indicators are interdependent. For example, the findings from case study III suggest that, as the average lead time to deliver product goes up, dependability and quality both decrease. Similarly when firms perform well in meeting promises made to their customers, the quality of service goes up. Although the first two case studies do not show a positive relationship between dependability and quality they leave a space for further investigation of the interrelationships by the Path Analysis method, since correlation does not identify causality. The negative relationship found between dependability and quality in the first two case studies points towards the 'trade-off' theory which suggests that improvement in one performance indicator is only possible at the expense of another.

The outcome of both Case studies I & II indicates that B2C information intensive firms should in particular focus on improving dependability to gain customer satisfaction. The finding from Case study III however opposed the findings of I & II since a positive correlation was evident between dependability and quality. The correlation was insignificant and needs further investigation using Path Analysis. Case studies I and II were on the other hand aimed at investigating the linkage between operations performance and customer satisfaction. Nevertheless, Ferdows and De Meyer (1990) also point out that 'trade-off' theory does not work in all cases and the outcome of case III supports this argument. The next chapter will attempt to support the findings of B2C cases into B2B cases.

# **Chapter 6**

## **Data Analysis**

### **Phase II**

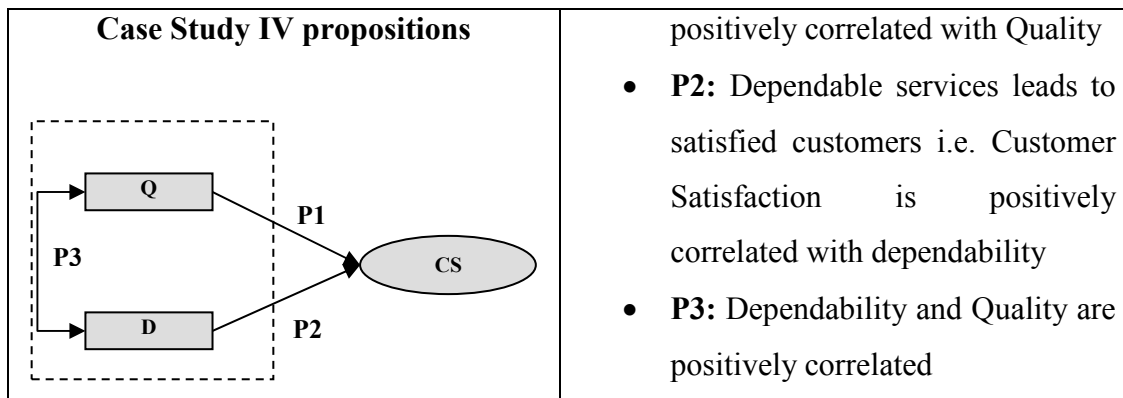
## 6.0 Introduction

The B2B and B2C information firms are different since their customer requirements are different as discussed earlier in the literature review chapter (Chapter 2). The previous data analysis chapter tested pre-established theories in B2C information intensive service firms. This chapter test the findings of B2C cases in B2B information intensive service firm. The secondary data set from two B2B case studies is subjected to investigation in this chapter. The purpose of this chapter is;

- *To test the findings of the B2C cases in B2B information intensive service firms*

The research objectives and propositions tested in B2B case studies in this chapter are shown in Table 6.1. This chapter is organised as follows: it starts with an overview of the utility firms studied in this thesis in section 6.1. Section 6.2 examines the research objectives and the propositions being tested in two cases. Section 6.3 concerns the data collection methods and type of data used. Section 6.4.1.1 - 6.4.1.2 provides an overview of the case study IV taken from a B2B network branch of the utility firm. Section 6.4.2.1-6.4.2.2 discusses the Case Study V taken from another B2B service provider. Finally, Section 6.5 provides the summary and conclusions for this chapter.

<b>Table 6.1: Research objectives and propositions tested in the second phase of the data analysis</b>	
<b>Research Objectives</b>	<ul style="list-style-type: none"> <li>• To investigate the linkage between dependability, quality and customer satisfaction in B2B information service settings.</li> <li>• To investigate the interrelationship between dependability and quality</li> <li>• To explore the relative effect of dependability and quality on customer satisfaction in B2B information intensive service firms</li> </ul>
<b>Case Study IV and</b>	<ul style="list-style-type: none"> <li>• <b>P1:</b> Customer Satisfaction is</li> </ul>



## 6.1 Overview of the firm: Utility

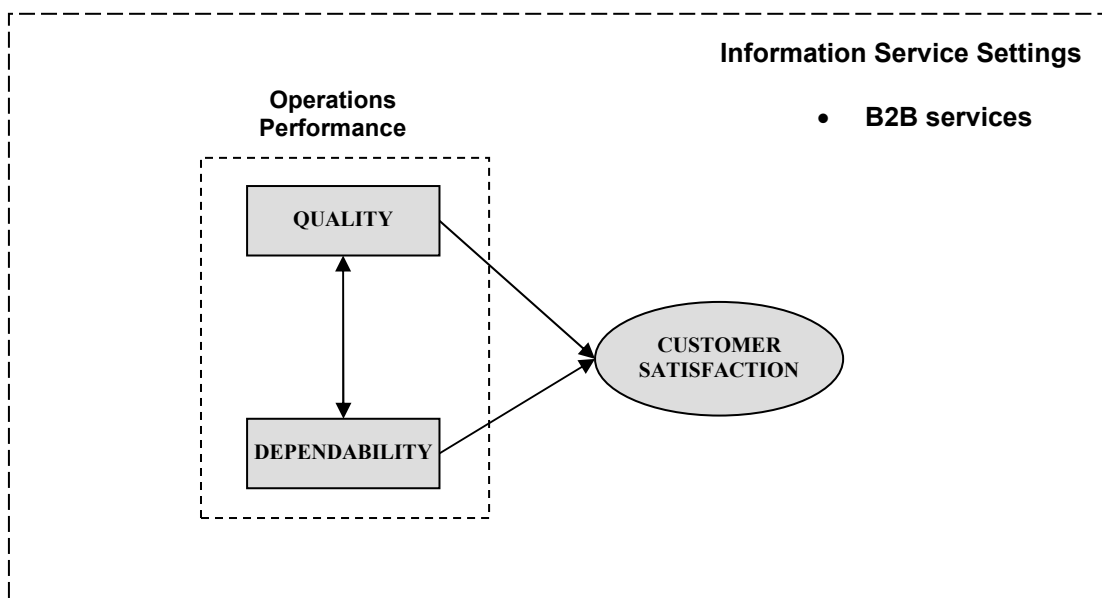
The data for the two cases studied in this chapter has been taken from two distinct branches of the utility firm referred to as firm ‘U’. The firm ‘U’ is one of the largest energy companies operating in the UK generating 20% of the UK’s electricity, employing more than 20,000 people and serving around 80 million customers and businesses. The firm is involved in different activities such as power generation, trading, transmission, distribution and supply. The firm operates nuclear power stations, thereby contributing a significant portion of the energy requirements of UK customers. The firm is also involved in building new, reliable, environmentally-friendly nuclear power stations and aims to provide affordable electricity to customers in the UK. The firm also operates power stations and wind- farms and deals with selling and buying electricity to meet customer demand. The firm is further involved in constructing and maintaining the basic infrastructure required to deliver power to customers and businesses.

The annual report published in 2009 shows that the firm ‘U’ is performing well financially and increased its customer retention by 23% during the period 2008-2009, also registering a gross profit of £758 million in the year 2008. The firm collects data to measure its performance over time through various data collection agencies. The data was collected from customers through telephonic interviews and in writing. The firm’s position as a market leader and access to its data were the key issues in its selection for this research. The data was available for the operations performance indicators, quality, dependability and customer satisfaction for all the three branches studied in this thesis. The discussion on data collection method is presented later in the upcoming sections. The next section examines the research objective of the cases studied in this chapter.

## 6.2 Research Objective

In the previous chapter the empirical findings from the B2C case studies point out that dependability and quality affects customer satisfaction. Additionally, dependability emerged as a critical performance element that significantly affects customer satisfaction. The findings also showed the relative significance of dependability over quality in B2C service firms, thus providing strong support for the ‘hard factor’ of quality as debated by some researchers (Newman, 2001; Luk and Layton, 2004; Bell et al., 2005). This chapter will attempt to support the findings of the B2C cases through studying the cases from B2B information service settings, and investigate the following research questions;

- *What is the interrelationship between dependability and quality in B2B information service settings?*
- *Does this further affects customer satisfaction?*
- *What is the relative effect of dependability and quality in information intensive B2B service firms?*



**Figure 6.1: Theoretical Research Framework for Case Study IV-V**

Consistent quality and dependability of delivery are critical operations performance indicators in service delivery systems, a fact acknowledged in the findings of the B2C cases. These two operations performance elements provide the basis for the framework given below (Figure 6.1) that will be used to test empirically the propositions in this chapter.

In this chapter the two cases (case IV & V) investigate the following propositions:

The first proposition also tested in B2C Case Study I & II, aims to investigate the relationship between customer satisfaction and quality i.e.

*P1: Customer satisfaction is positively correlated with Quality*

The second proposition investigates the relationship between dependability and customer satisfaction and was also tested in Case Studies I & II. The strength of the relationship will verify or refute the findings of the B2C cases in B2B service settings, which suggest that dependability is relatively more important.

*P2: Customer satisfaction is positively correlated with Dependability*

Case Studies I and II also argued that processes of service delivery system do not work in an isolated manner but affect and are affected by each other. Therefore, the third proposition of this chapter investigates the interrelationship between dependability and quality;

*P3: Dependability and Quality are positively correlated*

The next section indicates the data collection method used for the two B2B cases studied in this chapter.

### **6.3 Data Collection**

The data for the cases were collected from two distinct B2B branches of the utility firm. The operational activities of these branches are discussed later while examining the individual cases. The secondary longitudinal time series data set for all the cases was made available over a two-year (2006-2007) time frame after a series of meetings with company officials. The raw data set is shown in Appendix I. The data comprised monthly measurements of variables considered as proxies for quality, dependability and customer satisfaction. The longitudinal time series data set was collected by the data collection agencies on behalf of the firm in telephonic interviews and in writing.



Customers were asked a number of questions to gain a perspective on the firm's service quality level, delivery dependability and satisfaction with overall services for each branch. The data was checked for the reliability and validity issues. The data for the B2B cases were also subjected to certain assumptions such as data is normally distributed, no multicollinearity exists, there is a linear relationship between the variables and no outliers are present in the data. The 'Kolmogorov-Smirnov' and 'Shapiro-Wilk' tests of normality confirmed that the data for both B2B cases are also normally distributed. The upcoming sections discuss the case studies in detail.

## **6.4 B2B Case Studies**

Previous sections have already given the research objective and data collection methods. This section will examine the two B2B cases studied in this chapter. The upcoming sections will outline the cases, operationalize the key constructs, test the propositions and discuss the research findings. The first case study is from a B2B customer branch and the second is from a B2B network branch of the utility firm 'U'.

### **6.4.1 Case Study IV: Overview of B2B Network Utility branch**

Case Study IV was taken from the network branch of the largest B2B power supplier in the UK. The network branch is a distribution company that operates and maintains the electrical supply system for organisations with large energy need and spends. For B2B network branch the customers are mainly the Small and Medium scale Enterprises (SMEs) and large business firms. These organisations have more energy spend, ranging from 10,000 to 10 million units. The network branch is responsible for transporting electricity to businesses through the wires. Additionally, the network branch also restores power supply or repairs network faults that occur for a variety of reasons. The network branch currently provides energy to more than 30,000 organisations that together spend over £2bn on electricity and gas. The firm also offers a range of agreements for their business customers, such as fixed term contract, flexible purchasing contracts and specialist customer contracts.

The firm measures and collects data, through various data collection agencies, to monitor its performance over time. The data set for the two-year time frame (2006-

2007) was available for this research. The data set consists of monthly measurements for the constructs quality, dependability and customer satisfaction for the entire time frame. All the propositions discussed earlier in section 6.3 are tested in this case study. The operationalization of the key constructs is now discussed.

#### **6.4.1.1 Operationalization of key constructs**

In Case Study IV three variables in total, dependability, quality and customer satisfaction were measured and their interrelationships explored. The data set for Case Study IV is shown in Appendix J. The monthly data set was collected using the Likert 10 point scale. The operationalization of the key construct is set out:

##### **Customer Satisfaction**

In this case study in order to operationalize the ‘customer satisfaction’ construct, just as in the B2C case studies, a single item measure was used consistent with the approach of Voss et al. (2004). The data for this single item measure was collected by asking customers about their overall satisfaction level with the services provided.

Overall, how satisfied are you with the level of service?

##### **Dependability**

Literature review chapters point out that dependability refers to fulfilling promises, including time commitment (Slack et al., 2004; Taner and Antony, 2006) and has been used to operationalize this construct in the previous case studies. Therefore, to operationalize dependability measure customers were asked about their opinion on timely completion of promised services.

*‘My work was completed on time’*

##### **Quality**

Operationalizing quality is difficult and this has been emphasised throughout this work. As has been pointed out already none of the firms employed the SERVQUAL scale to measure the quality construct. The B2B firm used a single scale item to measure quality that closely resembles the ‘Access’ item of the SERVQUAL scale. The selection of the single item to measure quality was based solely on the firm’s decision and was

measured from the secondary data set where customers were asked about the ease/convenience of accessing staff members and support services:

*'It was easy to contact us to find out about the problem'*

The statement questions the ease of contact and belongs to the 'Access' dimension of the SERVQUAL scale (Lassar et al. 2000; Taner and Antony, 2006). The next section examines the research findings.

#### 6.4.1.2 Research Findings

The data was first subjected to descriptive analysis and the outcome is presented in Table 6.2.

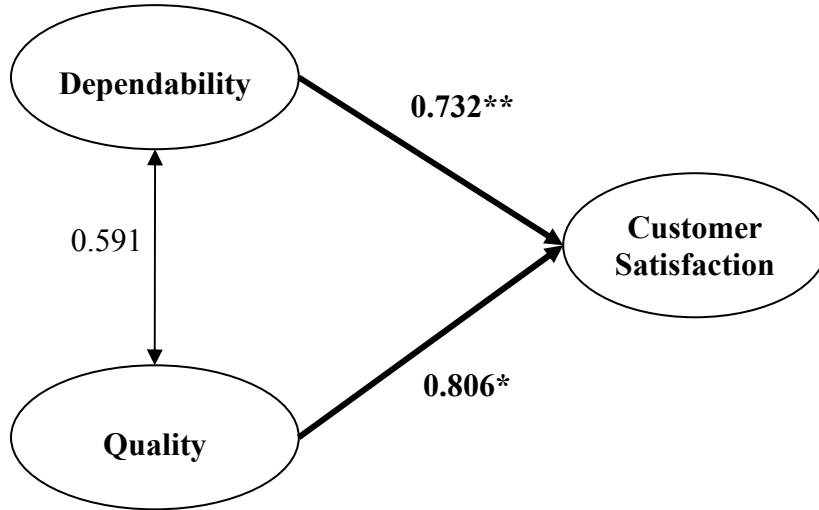
	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Quality</b>	8	47.00	90.00	56.1291	14.47992
<b>Dependability</b>	21	40.70	81.82	60.5308	12.09934
<b>Customer Satisfaction</b>	21	48.00	82.35	62.3173	10.67181
<b>Valid N (listwise)</b>	8				

The large variation in the data, as evident in Table 6.2 is due to the spread out of the data over a large range of values. Thereafter, correlation analysis was run using SPSS 15.0 and the outcome is shown in Figure 6.2. The correlation analysis shows a very strong and positive correlation (0.80) between quality and customer satisfaction significant at  $p < 0.05$ . This supports proposition P1. Correlation also indicates a strong and positive correlation (0.73;  $p < 0.01$ ) between customer satisfaction and dependability backing up the P2 proposition. The outcome of the correlation analysis supports the findings of service quality literature, which point to dependability and quality as key drivers of customer satisfaction. Additionally, positive correlation was found between dependability and quality, but this coefficient was insignificant. The correlation analysis supported all three propositions tested in this case study,

*P1: Customer satisfaction is positively correlated with Quality*

P2: Customer satisfaction is positively correlated with Dependability

P3: Dependability is positively correlated with Quality



\* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

**Figure 6.2: Correlation Analysis Result of Case Study IV**

	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	12.682	7.990		1.587	.173
Quality	.378	.157	.447	2.409	.061
Dependability	.505	.155	.606	3.264	.022

Adjusted R<sup>2</sup> = 0.843; Dependent Variable: Customer Satisfaction

Moreover, to verify the findings of correlations, regressions were carried out on the available data set. Regression analysis shows that dependability and quality all together explain around 84.3% (Adjusted R<sup>2</sup> value) of the variance. ANOVA analysis further validated this finding as means were significant (.004) at 1% level. The coefficients of regression analysis are presented in Table 6.3. To verify the strength of the individual measures, both the constructs were regressed in sequence against customer satisfaction. Regression results show that dependability on its own explains just around 51.2% of the variance, thus a large element of variance remains unexplained. Similarly, regressing

quality alone explains just 59.1% of the variance. However, the coefficients of both constructs were found to be significant and are shown in Table 6.4 and Table 6.5. The result indicates that, alone, both the constructs are unable to explain a majority of the variance but, in conjunction, they explain around 84.3% of variance.

**Table 6.4: Regression analysis result for Dependability and Customer Satisfaction**

	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	23.223	8.499		2.733	.013
Dependability	.646	.138	.732	4.687	.000

Adjusted R<sup>2</sup> = 0.512; Dependent Variable: Customer Satisfaction

These findings not only support the propositions put forward in the beginning of the chapter, they also offer an understanding of the interrelationship between operations performance indicators. The regression shows that dependability and quality are both significant drivers of customer satisfaction in the B2B environment. Moreover, although insignificant, but positive, correlation between dependability and quality shows that, with increase or decrease in dependability, the quality may also increase or decrease and vice versa. This also indicates that conforming to only one aspect i.e. either quality or dependability is not enough. Therefore, failure on one operations performance factor affects another.

**Table 6.5: Regression analysis result for Quality and Customer Satisfaction**

	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	23.303	11.786		1.977	.095
Quality	.680	.204	.806	3.332	.016

Adjusted R<sup>2</sup> = 0.591; Dependent Variable: Customer Satisfaction

These findings indicate that B2B firms should focus on improving quality and, at the same time, should provide dependable services to their customers to make them feel

satisfied. This is different from the findings of the B2C cases that supported the traditional ‘trade-off’ theory. This interrelationship will be further explored however using the Path Analysis method in the next chapter before any conclusions are drawn. The next section examines another B2B case study to justify the findings of case study IV.

### **6.4.2 Case Study V: Utility B2B Customer Branch**

The outcome of the first B2B case study varied from the findings of the B2C cases dealt with in the previous chapter. Therefore, another B2B case was studied to support the findings of case study IV. Case study V was taken from a B2B customer branch business unit of the parent utility firm ‘U’. This is a supply branch of the utility firm ‘U’ that sells energy to SME and large business customers. Currently, they have about 5 million customers throughout the UK. This branch deals with everything, from signing up a new small to medium business (SME) or large company, to dealing with all their billing queries. This supply division of the firm buys and sells power to meet the needs of its business customers.

The customer branch of the firm also collects data through data collection agencies to continuously monitor and improve its performance over time. The secondary longitudinal time series data set of a two-year (2006-2007) time frame was shared, after meeting with the representatives of the firm. These data sets were also collected through telephonic interviews and in writing by the data collection agencies. The data consists of monthly measurement for the proxies of the constructs quality, dependability and customer satisfaction. The operationalization of the key constructs is elaborated on the next section.

#### **6.4.2.1 Operationalization of key constructs**

Case study V also measures, in total, three variables which consist of two operational performance indicators (quality and dependability) and customer satisfaction. The data set for this case study is shown in Appendix K. The monthly data set was collected on the same Likert 10 point scale. The operationalization of these three constructs is presented below.

## **Customer Satisfaction**

A single item scale was used to measure the customer satisfaction in this case study also. The data was collected from the secondary data set where customers were asked about their satisfaction with the level of service provided by the firm.

Overall, how satisfied are you with the level of service?

## **Dependability**

Dependability means the ability of the firm to deliver reliable specified services to the end users (Raajpoot, 2004; Slack et al., 2004; Taner and Antony, 2006). Since case study V is taken from a customer branch which is involved in selling power and dealing with billing queries. It is also responsible for providing meter reading services. Hence, in this case study dependability is measured as a firm's ability to provide billing and meter reading service accurately and as promised. The firm measured the dependability of their services by measuring how well and accurately the meter reading and billing services were handled. This measure was also used by Parasuraman et al. (1985:47) in their study of the conceptual model of service quality. The construct was measured based on the responses taken from the four questions asked during the telephonic survey;

1. Overall, how would you rate the non half hourly bills and billing service
2. Overall, how would you rate the half hourly statements and invoicing service
3. Overall, how would you rate the non half hourly meter reading service
4. Overall, how would you rate the half hourly meter reading service

## **Quality**

As discussed in previous cases, quality has always been difficult to operationalize. Moreover, this thesis has argued that quality has been addressed from 'soft quality' aspects. Although the literature has shown that quality is a multi-dimensional attribute, the B2B customer branch firm measured it on a single item scale. To measure the quality construct, the questionnaire involved asking customers' their opinion on the firms understanding of their need. This, question aligns with the 'empathy' item (Zeithaml et al., 1988; Taylor and Cronin, 1994; Taner and Antony, 2006) of the SERVQUAL scale i.e.

We care for our customers

The monthly data set was collected on the Likert 10 point scale where 1 = strongly disagree and 10 = strongly agree. The next section analyses in detail the findings of this case study.

#### 6.4.2.2 Research Findings

The data from case study V was first subjected to descriptive analysis using SPSS 15.0 software. The means and standard deviations are presented below in Table 6.6. Correlation analysis was run on the longitudinal time series data set (Figure 6.3) and indicates a strong correlation between dependability and customer satisfaction significant at 1% level ( $p < 0.01$ ). A strong and positive correlation was also found between quality and customer satisfaction. Additionally while a positive correlation was evident between dependability and quality measures, it was found to be insignificant. All the findings of this case study are consistent with those of the previous B2B case. The correlation analysis supports all the P1, P2 and P3 propositions,

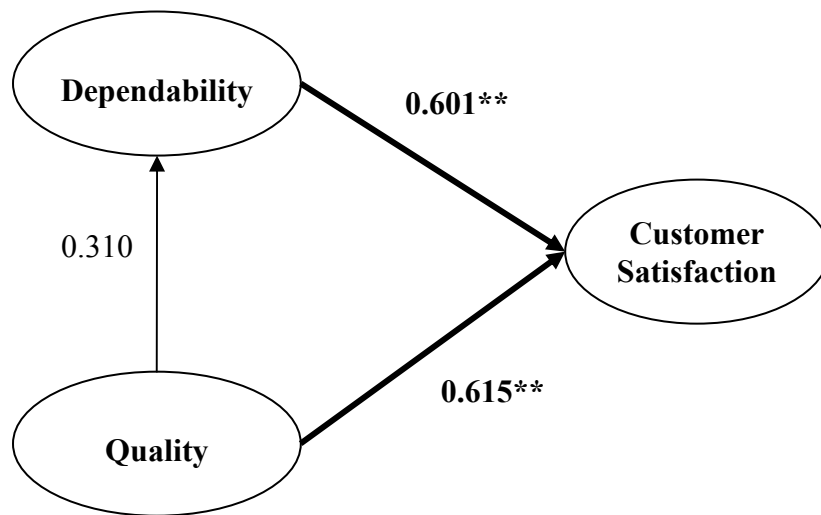
*P1: Customer satisfaction is positively correlated with Quality*

*P2: Customer satisfaction is positively correlated with Dependability*

*P3: Dependability is positively correlated with Quality*

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Quality</b>	23	55.31	68.15	60.4022	3.30752
<b>Dependability</b>	23	288.61	336.53	313.5795	16.48067
<b>Customer Satisfaction</b>	23	67.49	80.00	71.9238	3.34731
<b>Valid N (listwise)</b>	23				





\*\* Correlation is significant at the 0.01 level (2-tailed).

**Figure 6.3: Correlation analysis result of Case Study V**

Regressions were run on the data set to verify the correlation analysis findings. Regression analysis demonstrates that dependability and quality together explain around 52% (Adjusted  $R^2$  value) of the variance. The coefficients for both dependability and quality were found to be significant at  $p < 0.01$  level as shown in Table 6.7 below. ANOVA analysis further verifies this, as the means were also significant at 1% level. Since correlation highlights the significant relationship between dependability and customer satisfaction as well as between quality and customer satisfaction, therefore to test their strength, regression analysis was performed between the individual elements. Regressing dependability on customer satisfaction explains around 33% (Adjusted  $R^2$  value) of the variance (Table 6.8). Regressing quality on customer satisfaction on the other hand explains around 35% (Adjusted  $R^2$  value) of the variance (Table 6.9). Both the coefficients were found to be significant at  $p < 0.01$  level. Although regressing individually coefficients were found to be significant, a wide variance still remains unexplained as accounting for less than 50% of the variance. Nevertheless, together they explain around 52% of the unexplained variance. The low adjusted  $R^2$  value suggests that there might be other factors not analysed in this model might be affecting the customer satisfaction variable. Therefore, the regression analysis findings will be further verified using the Path Analysis method in the next chapter.

<b>Table 6.7: Regression analysis for customer satisfaction, dependability and quality</b>					
	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	14.013	11.392		1.230	.233
Dependability	.092	.032	.454	2.927	.008
Quality	.480	.157	.474	3.055	.006

Adjusted R<sup>2</sup> = 0.52; Dependent Variable: Customer Satisfaction

Both elements of the operations performance are therefore of key importance in a B2B environment that affects customer satisfaction significantly. Regression consequently also supports propositions P1 and P2. Moreover, the finding also indicates that both elements impact together to affect customer satisfaction and possibly an interrelationship exists between the two operational performance indicators. Correlation analysis had already indicated a positive relationship between them. This needs further investigation however and will be subjected to Path Analysis later in this thesis.

<b>Table 6.7: Regression analysis for customer satisfaction and dependability</b>					
	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	33.632	11.120		3.024	.006
Dependability	.122	.035	.601	3.448	.002

Adjusted R<sup>2</sup> = 0.33; Dependent Variable: Customer Satisfaction

<b>Table 6.8: Regression analysis for customer satisfaction and quality</b>					
	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	34.337	10.535		3.259	.004
Quality	.622	.174	.615	3.573	.002

Adjusted R<sup>2</sup> = 0.35; Dependent Variable: Customer Satisfaction

## 6.5 Summary and Conclusions

This chapter investigates two case studies from B2B information intensive service firms. The objective here was to test the findings of the B2C cases in B2B cases investigated in the previous chapter. Case Study IV provides further evidence that dependability and quality are the key indicators that affect customer satisfaction. The case study V supports the finding of case study IV. Thus, the findings suggested that for B2B information intensive service firm, dependability and quality are important. However, this is different from the findings of the B2C cases where dependability alone emerged as a key indicator of customer satisfaction. Thus B2B findings did not support B2C case study findings. B2B cases also suggested a positive interrelationship among the operations performance indicators.

The outcome of the B2B case studies is interesting as it suggests that, for B2B firms, performing on only one element is not enough and service firms need to focus carefully on both aspects of operations performance. The B2C case studies directed towards the traditional ‘trade-off’ theory, advocating that performing on one aspect is possible only at the expense of the other. However, the outcome of the B2B firm contradicts the traditional ‘trade-off’ theory and suggests that simultaneous improvement on both operations performance indicators (dependability and quality) is possible. The outcome of all case studies is so far based on the correlations and regression analyses. Correlation does not indicate causality, thus, based on their findings, reaching conclusions about ‘trade-off’ theory is questionable. To explore the causality, the data from all the five cases need to be tested through Path Analysis modelling, which is a well-known tool for exploring causality. The next chapter will explore the Path Analysis outcomes. To check the consistency of the findings in all five cases, Meta Analysis methods have been used in this thesis. The next chapter will also deal with, in some detail, the findings of the Cumulative Meta Analysis.

# **Chapter 7**

## **Data Analysis**

### **Phase III**

## 7.0 Introduction

The first two phases of the data analysis deal in total with five case studies taken from different B2C and B2B information intensive service firms. The first phase of the data analysis involved testing the three B2C case studies whereas, phase II tested the two B2B case studies. Several propositions were tested to answer the research questions. One of the research questions tests the interrelationship among the operations performance indicators and their impact on customer satisfaction and loyalty i.e. explores the causality among the measures. Correlation analysis does not include causality, hence, to explore the causality this thesis uses the Path Model Analysis. As the research objectives of the B2B and B2C cases pursued in this thesis are the same the Cumulative Meta Analysis method was used to check the consistency of the findings. The latter will also lead to the generalisations in the B2B and B2C information service settings. The aims here are twofold;

- *To carry out Path Analysis and explore the causality among the measures, and*
- *To perform Cumulative Meta Analysis to check the consistency among the findings of all the five cases for the purpose of generalization*

Section 7.1 provides a brief overview of the Path Analysis method. Section 7.2- 7.2.5 demonstrates the Path Analysis results for all the five cases studied in this thesis. Section 7.2.6 summarises the findings of the Path Analysis. A brief overview of the Meta Analysis method and the justification for using Cumulative Meta Analysis are provided in Section 7.3. The findings of the Meta Analysis are given in Section 7.3.1. Finally, Section 7.4 summarises all of the conclusions based on the findings of the Path Analysis and Cumulative Meta Analysis.

### 7.1 Introduction to Path Analysis Method

This thesis uses the Path Analysis Method to explore the interrelationship among the operations performance indicators and, more specifically, to explore the causality. Path Analysis is a special case of Structural Equation Modelling (SEM) which is one of the emerging methodologies in the operations management and marketing science streams (Shah et al., 2006; McQuitty, 2004; Steenkamp and Baumgartner, 2000; Baumgartner

and Homburg, 1996; Igbaria et al., 1997). SEM has flourished as an efficient methodology in analyzing the complex relationships among the different variables. It is capable of generating models showing interconnectedness and its impacts (Kline, 1998). Unlike other statistical methods in SEM the researcher can analyze the entire theoretical model in one review (Kumar et al., 2008). The multi-iterated modelling approach of SEM allows detailed understanding of the particular variable in terms of key influencing factors. The graphical way of representation makes it easier to explain the outcomes, even to someone who's not statistically-minded.. Once the model is established it is compared using various fitness measures such as Goodness Fit Index (GFI), Adjusted Goodness Fit Index (AGFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), etc inbuilt in the model fitting programs (Jöreskog & Sörbom, 1989; Marsh et al., 1988, 1996).

Path Analysis is a special means of SEM that is used to find the causal relationship among the variables. Path Analysis allows examination of a set of relationships between one or more independent variables and one or more dependent variables, and estimates the relative importance of the alternative paths of influence (Ullman, 1996; Kline, 1998; Yang and Trewn, 2004; Kumar et al., 2008). In practice, it is a straightforward extension of multiple regressions, aimed at providing estimates of the magnitude of hypothesised causal connections between sets of variables (Everitt and Dunn, 1991). Another important aspect of Path Analysis is that it deals only with measured variables. The ability of Path Analysis to deconstruct the correlation between any two variables into a sum of simple and compound paths yields information about casual processes. The Path Analysis performs this task by computing both the direct and indirect effects of independent variables on dependent ones. This provides a more explicit explanation of the relationships under investigation.

In Path Analysis single indicators are used for each of the variables in the causal model. In this thesis Path Analysis is used to depict the inter-relationships between the variables and, most importantly, to show the effect of the observed operations performance elements on customer satisfaction and loyalty. Path Analysis therefore will explore the causality among the measured constructs. Moreover, it will provide justification for the earlier findings of the correlation and regression analysis methods.

## 7.2 Path Analysis of Case Studies (I-V)

This section seeks to verify the earlier findings in all five cases and further explore the causality among the operations performance indicators and customer satisfaction and loyalty. The outcome of the Path Analysis for each case will be detailed in upcoming sections:

### 7.2.1 Case Study I: Retail Banking

The first case study was taken from one of the largest retail banking firms operating in the UK. Correlation and regression analysis discussed in Chapter 5 show support for propositions P1 and P2 i.e.

*P1: Customer satisfaction is positively correlated with Quality*

*P2: Customer satisfaction is positively correlated with Dependability*

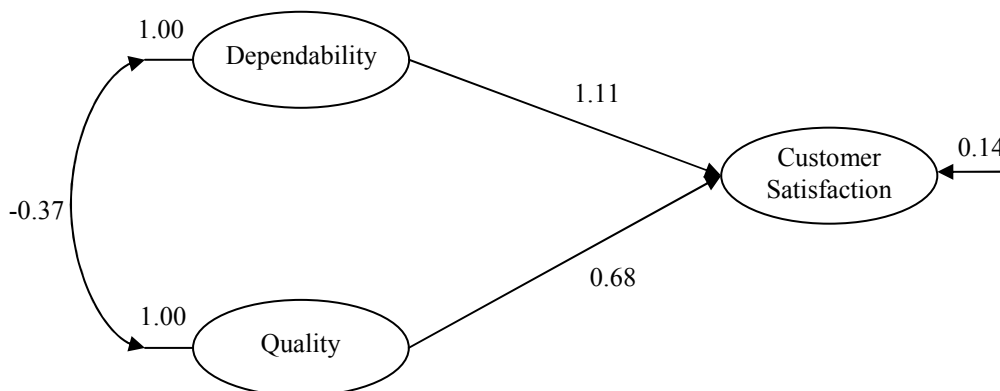
However, correlation analysis results did not support proposition P3 i.e.

*P3: Dependability and Quality are positively correlated*

The correlation analysis has already shown that dependability is a critical factor in driving customer satisfaction for B2C firms. The analysis also points towards the negative relationship between quality and dependability construct, though this correlation was not significant. To verify the findings and to explore further the causality, Path Analysis was run using LISREL 8.54 software. During the analysis a number of models were tested by eliminating some paths. A direct link, for example, between quality and customer satisfaction was ignored, as correlation and regression analysis did not show any strong supporting evidence for this relationship. Ignoring this link in the Path Model however resulted in a poor fit with the data. Similarly, different alternative models were tested and finally the best fit model was the 'perfect-fit' one linking all the three variables - quality, dependability, and customer satisfaction (Figure 7.1). The perfect fit model has all the optimal fitness values (for example,  $\chi^2 = 0$ ; RMSEA = 0) (Olsen and Kenny, 2006). A chi-square value of 0 here means that this

model is a perfect model i.e. observed values = expected values. Similarly, Root Mean Square Error of Approximation (RMSEA) value of 0 indicates perfect fit (Olsen and Kenny, 2006). The Path Model confirms that a negative causality exists between quality and dependability suggesting that dependability can be improved only at the expense of quality and vice versa, but thus shows that an interrelationship exists. Therefore the Path Analysis findings also point towards the traditional trade-off theory.

To investigate the significance of dependability over quality in the Path Analysis model the total effect was calculated by combining the direct and indirect effects. Indirect effect is calculated by multiplying the coefficients. For ‘quality’ construct, the total effect (0.27) on customer satisfaction was a result of the addition of the direct effect (0.68) and the indirect effect ( $-0.37 * 1.11 = -0.41$ ). On the other hand, for the ‘dependability’ measure adding the direct effect (1.11) and the indirect effect ( $-0.37 * 0.68 = -0.25$ ) resulted in a total effect of 0.86 thus, justifying the view that dependability is more significant for achieving customer satisfaction in B2C firms.



Chi-Square = 0.00; df = 0; P-value = 1.00; RMSEA = 0.000

**Figure 7.1: Best Fit Path Model for Case Study I**

Path Model Analysis justified the findings of the correlation and regression analysis for Case Study I. In addition it identified the causality between the operations performance indicators. The total effect of dependability was found to be stronger than quality, justifying its significance in achieving customer satisfaction. This suggests that, in B2C information intensive firms, practitioners should focus on improving dependability rather than simply looking at improving quality aspects. The next section will discuss the Path Analysis findings of the second case study.



## 7.2.2 Case Study II: Utility Firm

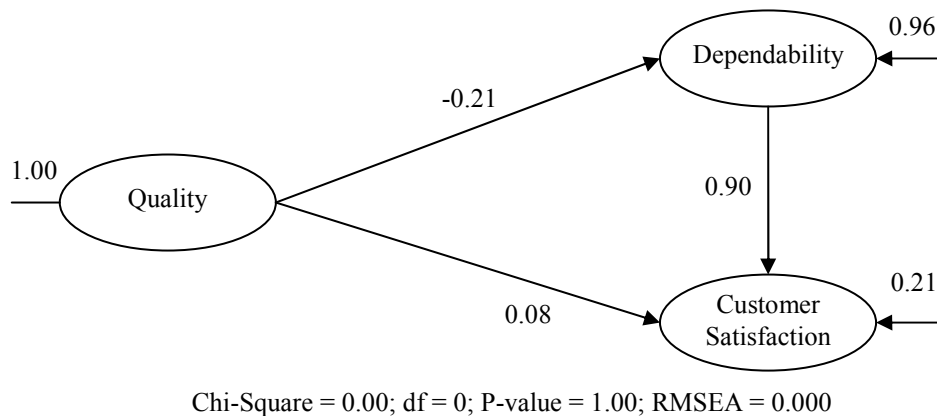
Case Study II was taken from a B2C service provider which is a special branch of a large utility firm, based in the UK, providing utility services to domestic customers. This case study also tested three propositions. The correlation and regression analysis provided support only to one proposition, P2,

*P2: Customer satisfaction is positively correlated with Dependability*

The correlation and regression analysis failed to support proposition, P1 and P3 i.e.

*P1: Customer satisfaction is positively correlated with Quality*

*P3: Dependability and Quality are positively correlated*



**Figure 7.2: Best Fit Path Model for Case study II**

Findings from Case Study II show that dependability is a key driver of customer satisfaction, likewise the first B2C case study outcome. The correlation analysis further points towards a negative correlation between quality and dependability. The correlation was however insignificant and nor did regression provide any further insight. Therefore, Path Analysis was carried out to explore the causality, as shown in the form of the Path Model in Figure 7.2.

The best fit Path Model had all the possible paths defined and hence is a 'perfect fit model' ( $\chi^2 = 0$ ; RMSEA = 0). Removing any paths from the model was resulting in poor fit of the data. The resultant best fit Path Model supported both propositions P1 and P2.

Path Model indicates a positive relationship between the quality and customer satisfaction as well as between dependability and customer satisfaction. However, the path coefficient between quality and customer satisfaction was found to be insignificant. The total effect of dependability (0.88) on customer satisfaction was found to be much higher than that of quality (-0.1) on customer satisfaction. This demonstrates that, dependability is a key driver of customer satisfaction. Path Model additionally justifies the finding of correlation analysis, namely that quality and dependability share a negative but causal relationship. It thus supports the ‘trade off’ model theory as in the previous B2C case (Case Study I) indicating that improvement in one comes at the expense of the other. The next paragraph will discuss the Path Analysis outcome of case study III.

### **7.2.3 Case Study III: Telecommunications Firm**

The third case studied was taken from one of the largest telecommunications firm based in the UK. This study aimed to investigate the link between operations performance and customer loyalty. This case study tested four propositions; the first three tested the impact of operations performance on customer loyalty, whereas the fourth tested the interrelationship among the operations performance indicators. The correlation analysis discussed in the previous chapter supported propositions P1, P2, and P4 i.e.

*P1: Customer Loyalty is positively correlated with Quality*

*P2: Customer Loyalty is positively correlated with Dependability*

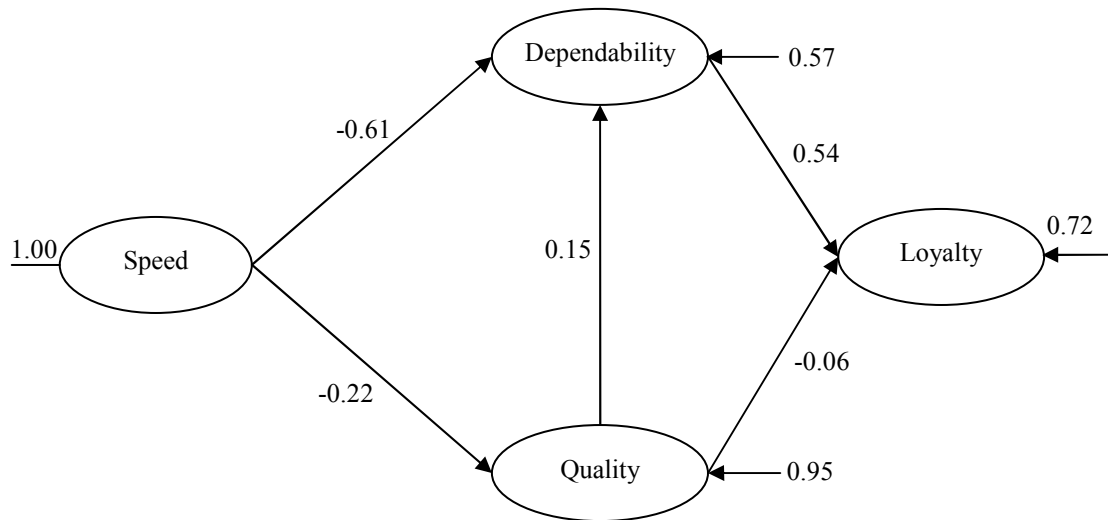
*P4: There is an interrelationship between operations performance indicators (dependability, quality and speed)*

However, correlation did not corroborate proposition P3, i.e.

*P3: Customer Loyalty is positively correlated with Speed*

The correlation analysis showed that operations performance indicators affect loyalty directly. Moreover, it also emphasised the interrelationship among the operations performance indicators. To explore the causality, Path Analysis was done on the secondary data set and an attempt was made to find the model that best fits the data.

After rigorous testing of different alternative Path Models, finally the best fit model was found and is shown in Figure 7.3. The fitness of this model against the standard fit indices is presented in Table 7.1 and demonstrates that the model fits well with the given data set. Appropriate fitness ranges for the indices are based on those suggested in previous literature (Green et al., 2006; Zeynep and Berry, 1996; Cheung and Rensvold, 2002; Driscoll et al., 2005).



Chi-Square = 0.21; df = 1; P-value = 0.64867; RMSEA = 0.000

**Figure 7.3: Best Fit Path Model for Case Study III**

The resultant Path Model sustains the propositions tested in this case study. It is evident from the Path Model that causal relationships exist among the operations performance indicators. Dependability and quality are positively linked whereas dependability and quality are negatively linked with the average ‘lead time’, the proxy for the ‘speed’. When the firm is able to meet the promises made to their customers, the quality level of the service goes up. On the other hand delayed service delivery, i.e. slower speed of the service, has a negative impact on dependability and quality. An increase in average lead time in delivering the service results in the firm’s failure to meet its promises. This interrelationship has a further impact on customer loyalty and justifies propositions P1 and P2. The total effect of dependability  $[(0.15 \times -0.06) + (-0.61 \times -0.22 \times -0.06) + 0.54]$  on loyalty was found to be 0.52 which is significantly higher than the total effect of quality  $[(0.15 \times 0.54) + (-0.22 \times -0.61 \times 0.54) + (-0.06)]$  on customer loyalty (0.09), thus suggesting that dependability is a key driver of customer loyalty. Correlation analysis highlighted that dependability is vital for achieving customer loyalty and the Path Model justified this finding.

<b>Fitness Indices</b>	<b>Fitness Range</b>	<b>Best Model Fit value</b>
Normed Fit Index (NFI)	> 0.95	0.99
Non-Normed Fit Index (NNFI)	≈ 0.95	1.14
Comparative Fit Index (CFI)	≈ 1.00	1.00
Incremental Fit Index (IFI)	≈ 1.00	1.02
Root Mean Square Residual (RMR)	≈ 0.00	0.014
Goodness of Fit Index (GFI)	> 0.90	1.00
Standardized RMR	≈ 0.00	0.012
Adjusted Goodness of Fit Index	≈ > 0.90	0.98

An interesting finding from the Path Model is that the ‘best fit’ model reveals no link between speed and customer loyalty. Correlation analysis also failed to find any significant relationship between these two constructs. When the speed and customer loyalty link was made, a negative insignificant relationship was evident. When this link was drawn the model was a poor fit for the data. Removing this link resulted in better fitness. In the previous chapter, based on the insignificant correlation between speed and loyalty it was argued that speed probably helps in customer acquisition but, in the long term, customer retention is mainly affected by the dependability and consistent quality. This has now been corroborated in the Path Model Analysis. Path Model also shows a negative link between quality and loyalty, although the value of coefficient is not significant. Correlation analysis also showed an insignificant correlation between quality and loyalty. This finding therefore suggests that quality does not impact directly on customers’ loyalty perception; rather it is dependability of the service that affects customer loyalty directly and significantly. Hence, the Path Analysis results support the findings of the correlation analysis and explain moreover the causality among the operations performance indicators. The next section will explore the Path Models of the two B2B cases studied in this chapter.

#### **7.2.4 Case Study IV: B2B Network Utility Branch**

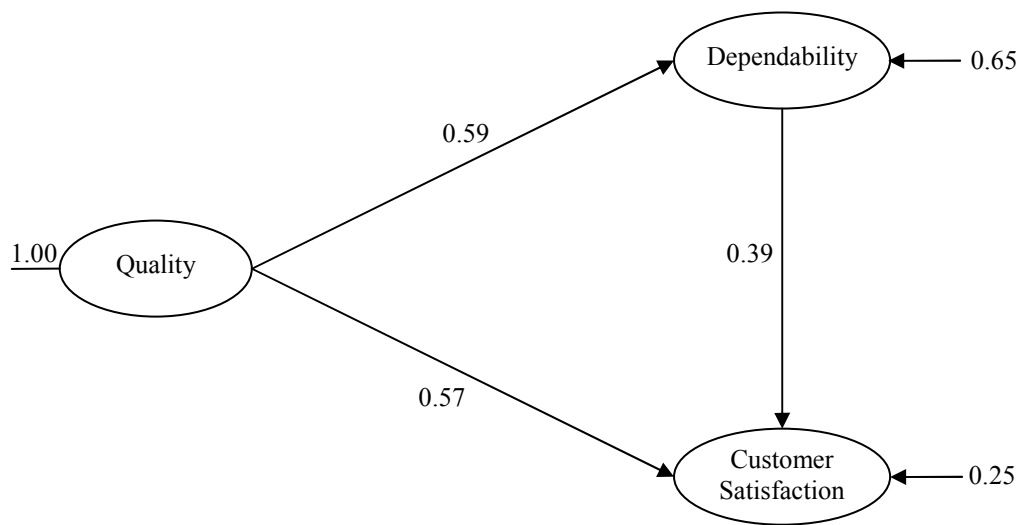
Case Studies IV and V aimed to test the findings of the B2C cases in the context of B2B information service settings. Correlation analysis of Case Study IV shows that dependability and quality are key indicators of customer satisfaction. This was an interesting finding since in the case of B2C information intensive firms, only dependability emerged as a significant indicator of customer satisfaction. The strong

and positive relationship between the dependability and customer satisfaction, as well as that between quality and customer satisfaction, supports propositions P1 and P2. Additionally, a positive but insignificant correlation was evidenced between quality and dependability. Thus, Case Study IV confirmed all propositions,

*P1: Customer satisfaction is positively correlated with Quality*

*P2: Customer satisfaction is positively correlated with Dependability*

*P3: Dependability and Quality are positively correlated*



Chi-Square = 0.00; df = 0; P-value = 1.00000; RMSEA = 0.000

**Figure 7.4: Best Fit Path Model for Case Study IV**

Path Analysis was carried out to explore further the casual interrelationships between the operational performance indicators. The resultant model was a ‘perfect fit model’ ( $\chi^2 = 0$ ; RMSEA = 0) and is shown in Figure 7.4. The Path Model supports the findings of the correlation and regression analysis. Path Analysis verifies that dependability and quality are positively linked, thus suggesting that performing well on one aspect of operations performance results in increased performance on another. This is different from the traditional ‘trade-off’ theory, as in this case, one does not have to trade-off between the two capabilities that are of great significance. The findings suggest that for B2B information intensive firms ‘trade-off’ theory is not well suited, as dependability and quality are both crucial in achieving customer satisfaction. The total effect of dependability  $[(0.59 \times 0.57) + 0.39]$  on customer satisfaction was found to be 0.73 and for quality  $[(0.59 \times 0.39) + 0.57]$  was 0.80. Thus, Path Analysis validated the previous

findings and provided evidence of causality among the measures. Finally, the next paragraph will discuss the Path Analysis results of Case Study V.

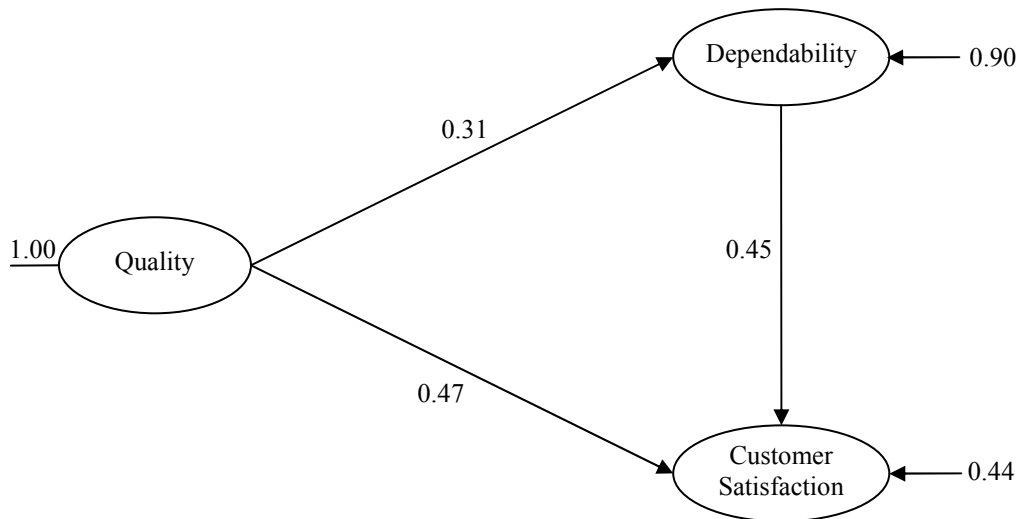
### 7.2.5 Case Study V: B2B Customer Utility Branch

Case Study V was investigated to validate the findings of B2B Case Study IV. The findings of Case Study V supported the findings of Case Study IV. Correlation analysis and regressions point out that dependability and quality are key indicators of customer satisfaction and strongly support propositions P1 and P2. A positive but insignificant relationship between dependability and quality demanded further exploration of this interrelationship through the Path Analysis method to support proposition P3. Case V also supports all propositions P1, P2 and P3,

*P1: Customer satisfaction is positively correlated with Quality*

*P2: Customer satisfaction is positively correlated with Dependability*

*P3: Dependability and Quality are positively correlated*



Chi-Square = 0.00; df = 0; P-value = 1.00000; RMSEA = 0.000

**Figure 7.5: Best Fit Path Model for Case Study V**

Path Analysis was carried out to explore causality and the Path Model is shown in Figure 7.5. Path Model for case study V is also a ‘perfect-fit’ model, having the best fitness ( $\chi^2 = 0$ ; RMSEA = 0). The Path Model validates the findings of the correlation

and regression analysis, that dependability and quality share a positive relationship with customer satisfaction. It also verifies the findings of the previous B2B case study where a positive relationship was evident between dependability and quality. This gives credence to proposition P3, suggesting that when quality goes up, dependability of service goes up and vice versa. Since quality and dependability share a positive relationship an increase in either results in increased customer satisfaction. The total effect of dependability  $[(0.31*0.47) + 0.45]$  on satisfaction was found to be 0.60 whereas the total effect of quality  $[(0.31*0.45) + 0.47]$  on satisfaction was found to be 0.61. Path Analysis thus indicates that for B2B information service firms both elements of the operations performance are of prime importance.

### 7.2.6 Summary

The findings from all five case studies suggest that operations performance and customer satisfaction relationship vary in B2C and B2B information service settings. Dependability emerged as a key indicator of customer satisfaction in B2C service settings, while in B2B service settings both dependability and quality emerged as key indicators of satisfaction. On one hand, B2C cases supported traditional ‘trade-off’ theory whereas, on the other hand, the findings of the B2B cases opposed the ‘trade-off’ theory. B2B cases implied that both elements of operations performance need to be taken care of to make their customers feel more satisfied. A summary of the Path Analysis findings are presented in Table 7.2.

<b>Table 7.2: Summary of Path Analysis findings for Cases I-V</b>	
<b>Case Studies</b>	<b>Path Analysis Outcomes</b>
<b>Case Study I (B2C)</b>	<ul style="list-style-type: none"> <li>• Dependability and Quality share a negative causal relationship</li> <li>• Dependability is a key indicator of Customer Satisfaction</li> <li>• The findings direct towards the traditional trade-off theory</li> </ul>
<b>Case Study II (B2C)</b>	<ul style="list-style-type: none"> <li>• Dependability and Quality share a negative causal relationship</li> <li>• Dependability is a key indicator of Customer Satisfaction</li> <li>• The findings direct towards the traditional trade-off theory</li> </ul>
	<ul style="list-style-type: none"> <li>• Dependability and Delivery Speed as well as Quality and</li> </ul>

<b>Case Study III (B2C)</b>	Delivery Speed share a negative causal relationship <ul style="list-style-type: none"> <li>• Dependability and Quality share a positive causal relationship</li> <li>• Dependability is a key indicator of Customer Loyalty</li> </ul>
<b>Case Study IV (B2B)</b>	<ul style="list-style-type: none"> <li>• Dependability and Quality share a positive causal relationship</li> <li>• Dependability and Quality both are key indicators of Customer Satisfaction</li> <li>• The findings oppose the traditional trade-off theory</li> </ul>
<b>Case Study V (B2B)</b>	<ul style="list-style-type: none"> <li>• Dependability and Quality share a positive causal relationship</li> <li>• Dependability and Quality both are key indicators of Customer Satisfaction</li> <li>• The findings oppose the traditional trade-off theory</li> </ul>

The next section deals with the Meta Analysis outcomes which aim to integrate the findings of all five cases studied in this thesis, and to check the consistency among the findings. This will also help to generalize the findings across the information service settings.

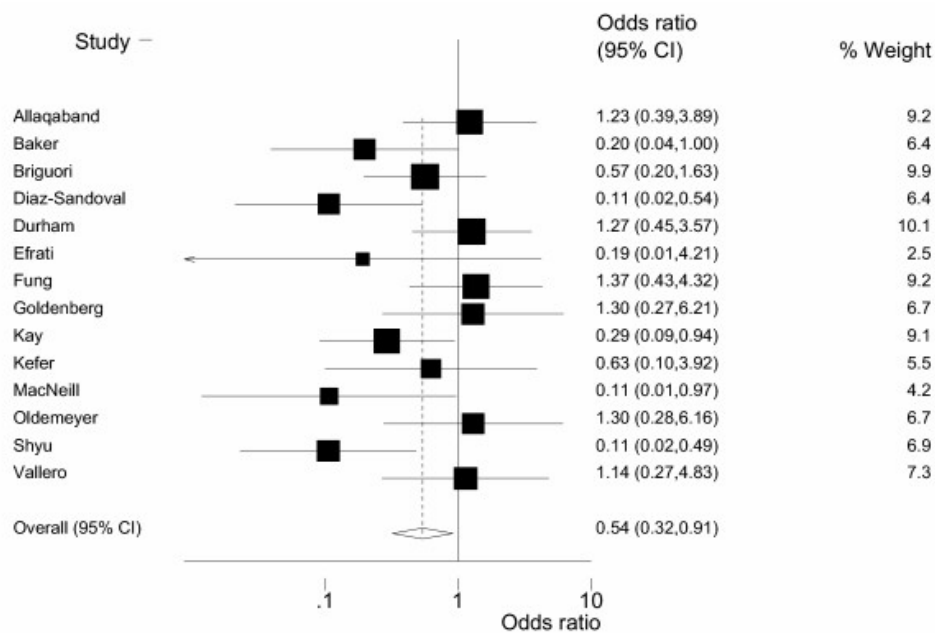
### 7.3 Meta Analysis

Meta Analysis has attracted interest from operations and quantitative researchers in recent years (Thompson and Pocock, 1987; Forza and Nuzzo, 1998; Davies and Crombie, 2001; Nair, 2006; Saleh et al., 2006) due to its ability to summarise the findings of previous studies and to provide a large and reliable sample for drawing conclusions. Meta Analysis is basically a technique to combine the findings of previous studies in a rigorous and systematic manner (Streiner, 2003). However, in this thesis Meta Analysis is targeted at combining the findings of all five cases and thus to check the consistency among findings for the purposes of generalization.

Chapter 4 on research methodology already pointed out that Meta Analysis compares the studies, based on the degree of variation, and also provides a detailed description of this method. Traditional Meta Analysis method has frequently been used by medical



science and psychology researchers to draw conclusions from previous studies (Smith and Glass, 1977; Peto, 1987; Greenland and Longnecker, 1992; Johnson et al., 1995). However, the traditional Meta Analysis overlooks two important aspects - sufficiency and stability. This has already been discussed in detail in Chapter 4. Hence, to solve this problem, this thesis adopts a Cumulative Meta Analysis method (Hunter et al., 1982). Cumulative meta-analysis performs new Meta-Analyses at successive points in time in a research setting in order to overcome the shortcomings associated with traditional Meta Analysis methods (Muellerlelle and Mullen, 2006).



**Figure 7.6: Graphical representation of Forest Plot (Source: Bagshaw and Ghali, 2004)**

The data generally used for performing Meta Analysis takes the form of mean differences, weighted regressions, standard deviations, correlations or effect sizes. However, out of these, correlation coefficient is the one which is used most often (Law, Schmidt and Hunter, 1994; Field, 2001). The analysis also includes the selection of one of the three models i.e. equal effects model, fixed effect model, or random effects model for combining the evidence across similar studies. There is no clear indication as which model should be preferred as all have certain pros and cons. The random effect models facilitate unconditional inferences and this thesis aims to generalize the inferences beyond the studies included in the Meta Analysis (Field, 2001). Hunter and Schmidt (2004) also point out that the random-effects model is more appropriate for real world data. In summarising the studies, Meta Analysis gives more weight to those with more precise estimates. In this chapter, for the purpose of the analysis correlation coefficients,

standard deviation, effect sizes and standard errors from the studies have been used as a source of input data from all five cases. The finding of the Meta Analysis is usually interpreted by drawing the forest plot. Forest plot shows the relative strength of the cases studied, that are aimed at answering the same set of research questions. Figure 7.6 shows an example of the graphical representation of a forest plot (Bagshaw and Ghali, 2004).

The horizontal line or the bars in the Forest Plot represent the 95% confidence interval (CI) whereas the central line represents the null hypothesis. The square or dot on each line represents the point estimate (mean value) of each case study. The size of the square for each bar corresponds to the weight assigned to each study in the Meta Analysis. The overall confidence level for all the studies is represented by a diamond shape. The findings of the Meta Analysis in the forest plot are drawn on the logarithmic scale where the data used is dichotomous and presented on a linear scale if continuous data is used (Bagshaw and Ghali, 2004). The next section discusses the research findings of the Meta Analysis of the five cases studied in this thesis.

### **7.3.1 Meta Analysis Findings**

Before proceeding to discuss the Meta Analysis findings it is necessary to emphasize again that Meta Analysis method in this research is not aimed at including the studies of the other researchers, but that this method has been used to sum up the findings of just the five cases studied in this thesis. Combining studies will overcome the problem of large sample size to justify the findings. Mean of the correlations, standard errors, standard deviation and effect sizes for each case study was calculated and is shown in Table 7.3. These statistics are generally used as an input data source for the Cumulative Meta Analysis. For the purpose of the analysis in this research only mean of correlation coefficients and standard error data were used. The analysis was run on Mix 1.7 software developed by Bax et al. (2006; 2008) using Excel 2003. This software is freely available to download for academic purposes from the website (<http://www.mix-for-meta-analysis.info/#>). Meta Analysis results obtained using Mix 1.7 software have been validated by their developers, using two major statistical packages STATA and CMA; this demonstrates the reliability of the findings using this software.

	<b>Std. Error (SE)</b>	<b>Std. Deviation (SD)</b>	<b>Correlation Coeff. (CC)</b>	<b>Effect Size (EF)</b>
<b>Case Study I</b>	0.112910041	0.4944242	0.251333	0.5193371
<b>Case Study II</b>	0.209961125	1.147747	0.342333	0.7286955
<b>Case Study III</b>	1.925306224	9.233444283	0.190333	0.387755
<b>Case Study IV</b>	3.362832523	12.417023	0.709667	2.0145601
<b>Case Study V</b>	1.608028374	7.7118332	0.508667	1.1816218

This thesis uses the Cumulative Meta Analysis (CMA) method to overcome the shortcomings of the traditional Meta Analysis. The snapshot of the summary data, input using the random-effect model, is shown in Figure 7.7. The snapshot of the Cumulative Meta Analysis results using Mix 1.7 is shown in Figure 7.8. The result reveals the cumulative confidence interval ranges, Fisher’s Z value and P value for each of the five case studies along with the Meta Analysis findings. The outcome also shows the weights assigned to individual studies. The P-values indicate that the finding of the Cumulative Meta Analysis is significant at 1% level.

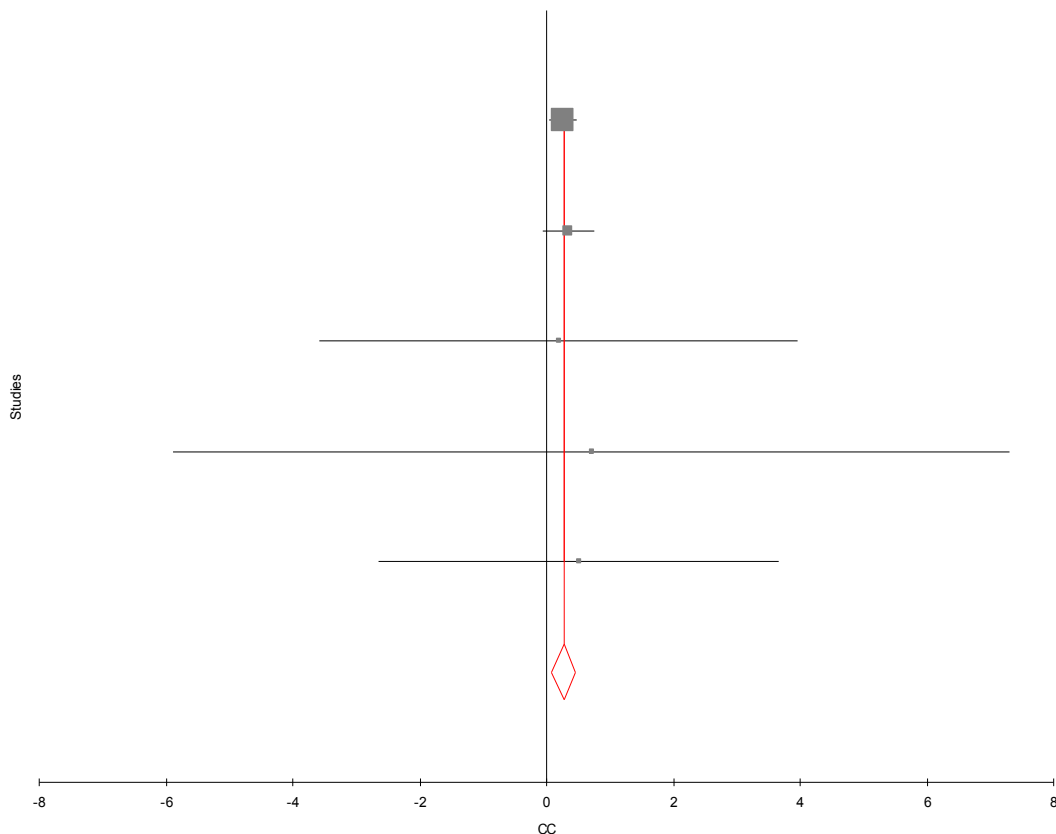
As pointed out in the previous section Meta Analysis findings are usually represented in graphical form using Forest plot. Figure 7.9 shows the standard forest plot for the Meta Analysis. Annotated forest plot (Figure 7.10) and cumulative forest plot (Figure 7.11) were also drawn in order to have a clear interpretation of the findings.

Study ID	Study date	<u>CC (DL)</u>			p	Weight bar	<u>andom effects model</u>
		CC	95% CI	Weights (DL)			
Study 01		0.2513	0.03 to 0.4726	0.026		77.00%	
Study 02		0.3423	-0.0692 to 0.7538	0.103		22.27%	
Study 03		0.7097	-5.8814 to 7.3007	0.8329		0.09%	
Study 04		0.5087	-2.643 to 3.6603	0.7518		0.38%	
Study 05		0.1903	-3.5832 to 3.9639	0.9213		0.26%	

**Figure 7.7: Input Summary of the Cumulative Meta Analysis data**

CUMULATIVE META-ANALYSIS							
Ordered by Original input		Random effects model (DL)					
Study ID	Cumulative CC	95% CI	z	p	Weight bar	# of studies	
Study 01	0.2513	0.03 to 0.4726	2.226	0.026		1	
Above & Study 02	0.2717	0.0768 to 0.4667	2.7327	0.0063		2	
Above & Study 03	0.2721	0.0773 to 0.4669	2.7377	0.0062		3	
Above & Study 04	0.273	0.0786 to 0.4675	2.752	0.0059		4	
Meta-analysis outcome	0.2728	0.0786 to 0.467	2.7535	0.0059		5	

**Figure 7.8: Cumulative Meta Analysis Outcome**

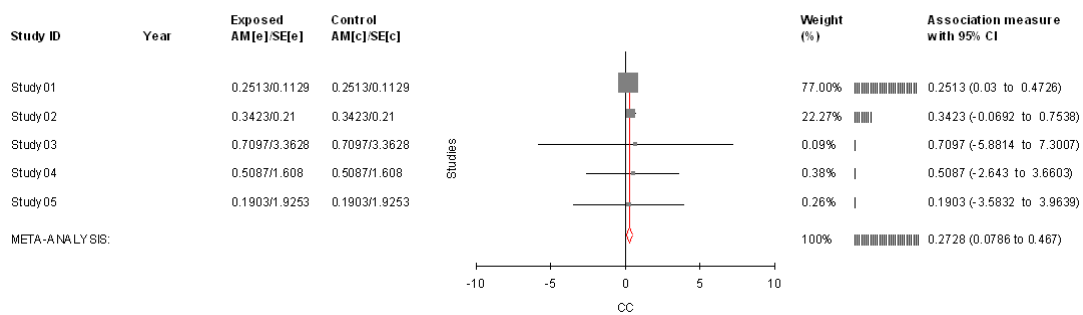


**Figure 7.9: Standard Forest Plot for all the cases**

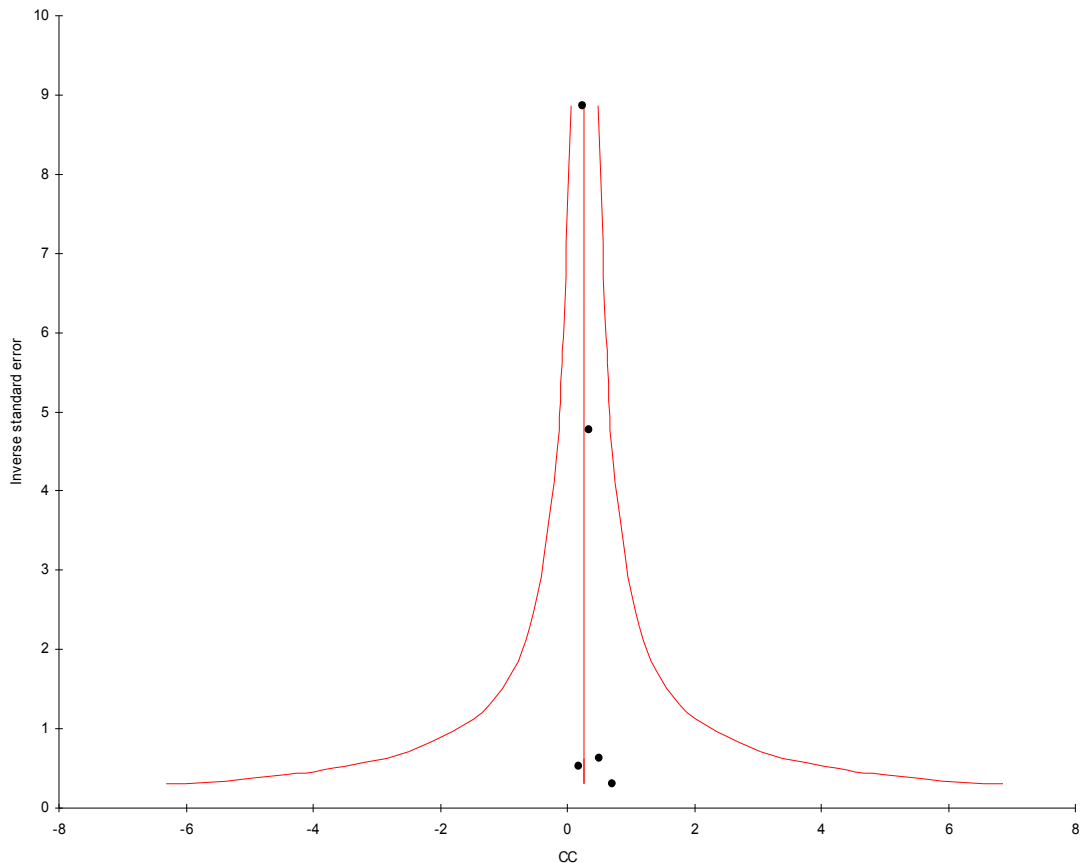
The outcome of the cumulative Meta Analysis shows that the findings are significant at 1% level. The horizontal bars for all the case studies fall within the extremities at both ends, which indicate that the findings are equivalent. The standard forest plot also indicates that all the findings from the five cases do not vary much between them. The diamond shape shows the summary of the estimate and the two ends of the diamond shape show the 95% confidence interval. The less variation between the studies as evident in Figure 7.9 is a good indication, since all case studies were aimed at answering the same set of research questions from information service sector. Both the standard and annotated forest plots also demonstrate that B2C case findings are very close to each other, thus pointing out that all of them from the B2C sectors are steered

in the same direction. This strongly points towards a generalization of the findings across B2C information services.

The forest plot shows that the Case Study IV and V findings differ from the B2C cases. However, the Case Study IV and V findings are very close since both are B2B service providers. The small variation in the B2B and B2C Meta Analysis results is due to the fact that for B2C cases only dependability emerged as a key indicator affecting satisfaction and loyalty. But, for B2B cases, both quality and dependability were found to be significant contributors to customer satisfaction. This also emerged in the correlation, regression and Path Analysis outcomes. Cumulative Meta Analysis (CMA) thus provides support for the findings of correlation and regression analysis. The outcome of Cumulative Meta Analysis suggests that findings can be generalized across B2C and B2B information service settings, as the estimates from all studies are equivalent. Moreover, since all the cases were aimed at answering the same set of research questions, by combining all the five cases Meta Analysis provided a large enough sample size to justify the individual case study findings. As a result, the benefit of Meta Analysis used here is twofold; to provide justification to the findings of the five cases; and to help in the generalization of the findings across information service settings. The next section summarises and concludes this chapter.



**Figure 7.10: Annotated Forest Plot**



**Figure 7.11: Cumulative Forest Plot for all five cases**

## 7.4 Summary and Conclusions

The chapter introduced the Path Analysis method and tested Path Models, for all five cases, to explore the issue of causality. The Path Model outcome shows that causality exists among the measures, especially among the operational performance indicators. Additionally, it indicates how the interrelationship among the operations performance indicators affects customer satisfaction and loyalty. Further Meta Analysis was carried out on the data sets from all five case studies to check the consistency among the findings. Cumulative Meta Analysis was preferred over the traditional Meta Analysis, to overcome some of its drawbacks. Cumulative Meta Analysis demonstrates that findings across all the five cases are consistent. The analysis also distinguished the variation between B2C and B2B case studies and thus supported a generalization of the findings across the information service settings.

The aim of the Path Analysis method in this thesis is to provide additional verification of the findings of the correlation and regression analysis. The findings from both the conventional statistical analysis and Path Analysis suggested that personal customers are more bothered about whether the promises made by the firms are fulfilled or not i.e. their satisfaction level is primarily motivated by the dependability of services. The findings suggested that personal customers can ignore the performance of one indicator if they feel satisfied with the other, as opposed to the business customers who do not get carried away when a firm performs just on one aspect. This finding does not infer that personal customers ignore quality aspects but rather that, although dependability of services is crucial for achieving satisfaction, a reasonable level of quality of service is essential. It suggests moreover that B2C information service firms should not focus simply on quality improvement programmes but preferably should work on improving the dependability of their services.

The outcome also points towards the ‘trade-off’ theory in B2C cases, where improvement in one element comes at the expense of the other. There are, too, plenty of examples of firms that are against the principles of traditional trade-off theory available in literature (Jaikumar, 1986; Jones et al., 1988; Ferdows and De Meyer, 1990). This was also evident in Case Study III where a positive causal link was evident between dependability and quality. The findings of B2B cases however challenge the traditional ‘trade-off’ theory. B2B cases show that simultaneous improvement on both operations performance indicators is possible, which possibly signals the ‘sand cone model’ theory (Ferdows and De Meyer, 1990) which suggests that, once significant improvement in quality is achieved, firms should continue expanding on quality, while, at the same time, they should begin to focus on dependability and then further on to other operations performance elements. However, this research does not intend to test the ‘sand cone model’ theory. B2B firms are more systematic in their approach, while evaluating operational performance of the services they receive, which might be another reason behind the significance of both operational elements in driving customer satisfaction.

Cumulative Meta Analysis was preferred over the traditional Meta Analysis in this thesis and was run on the data sets from the five cases studied. The findings indicate that all five cases do not vary much among themselves from the mean of the estimate, demonstrating a consistency among the findings. However, the Cumulative Meta Analysis finding acknowledges small differences in the findings as between B2C and

B2B cases since they have different customer requirements. This difference can be also accepted from the findings of the conventional statistical and Path Analysis, which indicated that, for B2C firms, only dependability is a crucial factor in achieving customer satisfaction while for B2B cases both the dependability and quality measures are significant contributors to customer satisfaction.

The Cumulative Meta Analysis method was used to integrate all the case studies to provide a larger sample for obtaining findings that were aimed at answering the same set of research questions. Cumulative Meta Analysis findings strongly support a generalization of the findings across B2C and B2B information services. The forest plot also makes clear that case study findings do not vary much from the mean estimate and thus support a generalization of the findings in the information service sector. This thesis leaves scope for future research work, where the work of different researchers can be included in an overall study from the literature to further test the reliability of the Meta Analysis findings. The next chapter will provide a summary and conclusions of this research. The next chapter will also highlight the contributions of this thesis and suggest some future research directions.



# **Chapter 8**

## **Contributions**

## **8.0 Introduction**

This chapter summarises my thesis and draws conclusions from the findings of the empirical research which was carried out on the five case studies selected for this study and detailed in the data analysis chapters. The findings from all the five cases have been re-visited to match them with the research objective of this research. The chapter also presents a reflection on the research process and discusses the contribution of this research from the academic and practitioner's viewpoint. The limitations of the research are also highlighted and the chapter concludes by suggesting some directions for further research.

This chapter is organised as follows. Section 8.1 provides a summary of the research objectives. The conclusions drawn from the empirical findings are presented in section 8.2. Section 8.3 provides a reflection on the research process adopted in this thesis. The contribution of this research both to the academic and non-academic community is highlighted in section 8.4. The limitations of this research are presented in section 8.5. Finally, section 8.6 makes some suggestions for future research.

### **8.1 Re-visiting Research Objectives**

The prime objective of this thesis was to *explore the linkage between dependability, quality and customer satisfaction in information-service settings*. This thesis also explored the interrelationship among the operations performance indicators and their further impact on customer satisfaction. The relative effect of dependability and quality on customer satisfaction in B2C and B2B information processing firms was investigated. A number of propositions were tested in the data analysis chapters (Chapter 5, 6 and 7) using the secondary, longitudinal time series data set over a 24-60 months time frame in order to meet the research objectives. A summarised view of the research objectives of this thesis is presented in Table 8.1.

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**Table 8.1: Re-visiting Research Objectives**

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**Research Objectives**

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- R1. To explore the linkage between dependability, quality and customer satisfaction in information- service settings.*
- R2. To explore the interrelationship among the operations performance indicators and their further impact on customer satisfaction*
- R3. To explore the relative effect of dependability and quality on customer satisfaction in B2B and B2C information- intensive firms*
- 

In total five cases from different information processing firms operating in the areas of banking, telecommunications and utility in the UK, were studied to explore the linkages between operations performance and customer satisfaction. The case studies employed conventional analysis methods, together with the Path Analysis method, to investigate empirically the relationships. Finally, all the findings were summarised to provide a large sample for the Meta Analysis. Cumulative Meta Analysis was performed on the data sets from all five cases to check the consistency and the amount variation among the findings, which were aimed at addressing the same research objectives. The discussion of the empirical findings from all five cases is presented in the next section.

## **8.2 Discussion of Empirical Research Findings**

The analysis of the case studies was carried out in three phases. The conceptual model was developed to investigate the linkage between operations performance and customer satisfaction. The first phase of the data analysis included an investigation of the B2C cases. The aim of the study was to test the pre-established theories in B2C information-service firms. The aim of the second phase of the analysis was to challenge the findings of B2C cases in B2B information services. The third phase of the data analysis included testing all the case study findings using the Path Analysis method. The aim was to explore the causality and justify the findings of the conventional methods (correlations and regressions). The third phase of the analysis also used Cumulative Meta Analysis to check the consistency among the findings of all five cases for the purpose of generalisation. The discussion of the findings of all the three phases of analysis is presented below.

### **8.2.1 Phase I of the Data Analysis: B2C Case Studies I-III Findings**

Phase I of the data analysis involved testing the established theories in B2C information service setting. In total, three B2C information service firms were investigated in this research. Case Study I was taken from a banking firm whereas the Case Study II from a utility firm operating in the UK. The investigation of research questions showed the presence of a strong relationship between the dependability and customer satisfaction. An evidence of a negative interrelationship between the dependability and quality indicators was also found through the correlation and regression analysis. This pointed towards the traditional ‘trade-off’ theory, which implies that improvement in one performance indicator is only possible at the expense of the other. With the understanding that customer loyalty is also regarded as a performance outcome and there is a lack of research investigating the direct impact of operations performance on customer loyalty, Case III studied the link between operations three performance indicators (dependability, quality and speed) and customer loyalty in B2C information service settings. The findings showed that dependability is a prime driver of customer loyalty. The results also indicated that only dependability and quality impacts positively on loyalty. Average lead time (proxy for ‘speed’) showed a negative interrelationship with customer loyalty. This correlation coefficient was however found not significant and demanded further investigation. The relationships were later explored using the Path Analysis method in phase III of the data analysis. The emergence of dependability as a key indicator in the findings of the B2C case studies, suggested that practitioners should focus on improving the dependability of service rather than simply addressing customer satisfaction issues from the quality perspective in B2C information-intensive service firms. This finding also challenged the traditional priority afforded to quality in service quality literature (Appendix B) and supported the importance of hard quality aspects (Appendix C). However, this does not indicate that quality is unimportant rather, it suggested that once a substantial improvement in quality is achieved, the information-service firms should focus on improving their dependability of the service. However, one should remember that a correlation does not signify causality. Therefore, conclusions on the supporting evidence for a ‘trade-off’ theory were not reached in the first phase of the data analysis. Nevertheless, the consistency in the outcomes from the three B2C cases provided strong support for the generalization of the findings in the B2C information-service settings.

### **8.2.2 Phase II of Data Analysis: B2B Case Study IV-V Findings**

Phase II of the data analysis involved testing two B2B case studies to find support for the B2C findings. The first B2B case (Case Study IV) was taken from a network branch of a large utility provider in the UK. Whereas the Case Study V was taken from a customer branch of the B2B utility firm. The findings from the Case Study V supported the outcomes of Case Study IV and emphasized that, for B2B firms, both elements of operational performance (dependability and quality) are of key importance. The analysis from both B2B cases further also pointed towards a positive interrelationship between dependability and quality. The consistency in the findings from B2B cases provided strong support for a generalization across the B2B information service settings. The findings from B2B cases however were different from the B2C cases, where only dependability emerged as a key indicator of customer satisfaction. The positive relationship between dependability and quality indicated by B2B cases opposed the B2C case study finding. Thus making an argument that the priority afforded to operational indicators in B2B and B2C cases is different, since their customers are different. In the case of B2B information-services equal emphasis must be given to both quality and dependability. Failing to perform on one or the other will have a negative impact on customer satisfaction. Therefore, practitioners should provide accessible services and prompt delivery of the promises, to make their customers (i.e. businesses or organisations) satisfied. B2B case study finding also seem to oppose the traditional ‘trade-off’ theory since it argued that both the dependability and quality can be improved simultaneously. However, this argument was further explored using the Path Analysis method in Phase III of the data analysis.

### **8.2.3 Phase III of Data Analysis: Path Analysis and Meta Analysis**

The Phase I and II of data analysis employed the conventional data analysis methods. However, the correlations do not identify causality and therefore, the Path Analysis a recognised method for exploring the causality among the measures was used. For the Case Study I and II, the Path Analysis supported that dependability is a key indicator of customer satisfaction. Furthermore it also showed that a negative causality exists between the dependability and quality. Thus, if the dependability goes up, the quality goes down and vice versa and this further affects customer satisfaction. This finding shows that, for B2C firms, providing a dependable service is essential to having

satisfied customers. Again one must emphasise that this does not mean that quality is not important, rather it suggests that B2C firms should not just concentrate on quality improvement programmes but work hard to improve the dependability of the service. The findings from both B2C cases also indicated the existence of the ‘trade-off’ between the dependability and quality. Thus, the Path Analysis findings reinforced the ‘trade-off’ theory in the B2C service settings which revealed that improvement in one is only possible at the expense of the other.

Case Study III was analysed to investigate the links between operations performance elements and customer loyalty in the B2C information service firm. The Path Analysis indicated that dependability is a key driver of customer loyalty and a negative interrelationship exists between the delivery speed, dependability and quality whereas, a positive interrelationship between dependability and quality. Thus, the Path Analysis suggested that when dependability falls, then average lead time to deliver service rises, as those delivering the service responded to the failure to meet promised installation dates. In a similar way, when the dependability of service engineers visiting homes to install broadband diminishes, the quality falls as well. Moreover, when average lead time to deliver product rises it does affect quality negatively. Ultimately, poor operational performance in both dependability and quality directly and negatively impacted on customer loyalty. The Path Analysis also showed that no direct links exists between delivery speed and customer loyalty. Speed does have an indirect impact on loyalty through dependability and quality as they share a strong interrelationship. Previous studies have indicated that the relationship between operations performance and customer loyalty through customer satisfaction is a mediating variable. The outcome of this B2C case study research adds considerably to this by revealing dependability as an important driver of customer loyalty. Results suggest that speed may help in customer acquisition but in the long-term customer retention is mainly affected by dependability and consistent quality. While the literature tends to treat the three variables (dependability, quality and speed) independently, this research has shown that, like in any system, the elements are closely linked.

The Path Analysis of B2B case studies showed that dependability and quality both are key indicators of customer satisfaction. The analysis also confirmed that a positive interrelationship exists between dependability and quality that has a further, positive, impact on customer satisfaction. Thus, in a B2B service firm, performing well on both

indicators results in improved customer satisfaction. This finding was however different from the B2C case studies since it does not support the traditional ‘trade-off’ theory and points to the ‘Sand Cone Model’ theory (Ferdows and De Meyer 1990), which advocates that improvement in both the performance indicators is possible but it is necessary to achieve substantial improvement in one before focusing on the other. An investigation of the ‘Sand Cone Model’ theory is beyond the scope of this research however, it does leave scope for future investigation in this area.

To present a holistic view of the information-service settings Cumulative Meta-Analysis was performed on the data sets from all the five case studies. The data sets from all the cases were combined to form the input data set for the Cumulative Meta-Analysis, since all the cases were addressing the same research objectives. The role of Cumulative Meta Analysis in this thesis was to check for consistency in the findings of the case studies and provide support for generalization. The forest plot generated after running the Cumulative Meta Analysis showed that all five cases findings are very close to each other and to the mean of the analysis. The analysis therefore demonstrated that all the findings provide strong support for generalization. The small variation in the B2B and B2C findings was also distinguished in the forest plot, which is the result of the differences in the B2B and B2C businesses and their customer requirements. Therefore, the outcome of the Cumulative Meta Analysis suggests that the findings can be generalized across the B2B and B2C information-service firms, although with certain limitations. For example the case findings are limited to the information sector in the UK. The next section provides a summary of the discussions.

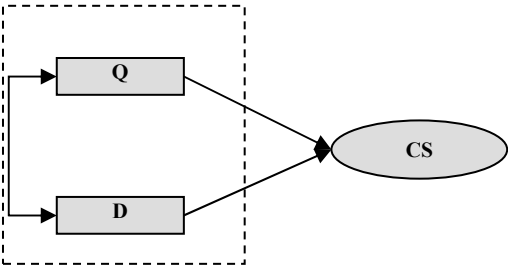
#### **8.2.4 Summary of the Discussions**

All five cases addressed the research objectives of this thesis. Their findings showed that dependability and quality significantly affects customer satisfaction and customer loyalty. The B2C findings challenged the traditional priority afforded to functional or relational quality by showing that dependability is the key driver of customer satisfaction and loyalty. B2B cases argued however that both components of operations performance (dependability and quality) are key drivers of customer satisfaction. The differences in the customer requirements of B2B and B2C businesses seem to be the possible reason behind the resultant differences in outcome. B2B customers moreover seem to be more informed and educated, thus performing well in only one aspect does

not lead to satisfied customers. B2C customers, on the other hand, seem to be satisfied even if the firm performed well in only one aspect of the operations performance and mostly when the firm performed well in providing dependable services. However, the outcomes from both the B2B and B2C cases showed evidence of an interrelationship between operations performance indicators and their further effect on satisfaction and loyalty.

A Path Analysis was carried out on all the case studies to explore the causality and justify the findings of correlations and regressions. The B2C case studies favoured the traditional ‘trade-off’ theory whereas the B2B cases opposed it. The outcome from the B2B case studies points toward the ‘Sand Cone Model’ theory. Although, the investigation of the ‘Sand Code Model’ theory is beyond the scope of this thesis, it suggests there is an opportunity for future research here. A summary of the findings of all five cases is presented below in Table 8.2.

**Table 8.2: Summary of the case studies and their corresponding empirical research findings**

Research Frameworks	Empirical Research Findings
<p><b>Case Study I and II (B2C)</b></p>  <pre> graph LR     subgraph Box [ ]         Q[Q]         D[D]     end     Q --&gt; CS((CS))     D --&gt; CS     </pre>	<ul style="list-style-type: none"> <li>• Dependability and quality affect customer satisfaction</li> <li>• Dependability is a key indicator affecting customer satisfaction</li> <li>• Dependability and quality share a negative interrelationship in B2C service settings</li> <li>• Challenges the traditional priority afforded to functional quality</li> <li>• The findings favour traditional ‘trade-off’ theory</li> </ul>
<p><b>Case Study III (B2C)</b></p>	<ul style="list-style-type: none"> <li>• Operations performance indicators (dependability, quality and speed) affect customer loyalty</li> <li>• Dependability and quality impacts directly on loyalty</li> <li>• Speed does not impact customer loyalty directly.</li> <li>• Dependability is a key indicator affecting customer</li> </ul>



	<p>loyalty</p> <ul style="list-style-type: none"> <li>• A strong interrelationship exists among the operations performance indicators</li> <li>• The findings show ‘trade-off’ theory does not work in all the cases</li> </ul>
<p><b>Case Study IV and V (B2B)</b></p>	<ul style="list-style-type: none"> <li>• Dependability and Quality affect customer satisfaction</li> <li>• Dependability and quality both are key operations performance indicators affecting customer satisfaction</li> <li>• Dependability and quality share a positive interrelationship in B2B service settings</li> <li>• The findings opposes the traditional ‘trade-off’ theory and directs toward the ‘Sand-Cone Model’ theory</li> </ul>

### 8.3 Reflections on the Research Process and Findings

This section provides an overview of, and justification for, the research design adopted in this thesis and the critical reflection on the research findings. Selecting the appropriate method for research is guided by a number of factors, such as availability, access, time, cost, and, most importantly, the research objective. Choosing the appropriate methods helps researchers to achieve the research objective and offers flexibility in the techniques used to justify their findings. Reflection on the research process not only justifies the extent to which the research design successfully meets the research objective but also provides an opportunity to explore the alternative research frameworks that could have been adopted.

This research was aimed at addressing the number of research objectives - to investigate the link between dependability, quality and customer satisfaction, to investigate the interrelationship between the dependability and quality, and to investigate the relative effect of dependability and quality in information service settings. The aims were to explore these issues in B2B and B2C information service settings and provide empirical supporting evidences. To address the research objectives, this thesis needed a structured

approach and a careful selection of the research methods. Following a critical evaluation of the research paradigms which are discussed frequently in management research, the positivism approach was favoured as it is more closely aligned with the research objectives. This thesis set out to evaluate empirically the relationships and so the quantitative method was the preferred choice. The research adopted a six-step research design inspired by the work of Sekaran (1992) and Sarantakos's (2005). This research follows a theory testing approach. Therefore a number of propositions were made for the purpose of answering the research questions. The Path Analysis method was employed to explore the causality among the measures. This thesis also employed the Cumulative Meta Analysis method to check the consistency among the findings from five case studies.

Although, this thesis adopts quantitative approach, the research questions could also be addressed using qualitative or mixed methods. The multi-method approaches i.e. combination of quantitative and qualitative methods, are popular in management research. The use of multi-methods however involves considerable time and cost, as well as a need to acquire a range of skills within the research timeline. Qualitative study requires access to within the firm to get enough responses to draw any conclusions. Under these constraints it was decided that the quantitative method was the most suitable and viable method of reaching the research objectives of this thesis. However, in future the scope of this research could be extended to apply the multi-method approach to increase the reliability of the findings.

This research adopted a theory-testing approach and re-tested the established links between dependability, quality and customer satisfaction, that are frequently discussed in Service Quality and Service Profit Chain literature, in UK based B2C and B2B information service firms. The findings from B2C case studies identify dependability as a key driver of customer satisfaction. This finding provided support to literature which counter-argued for the traditional priority afforded to relational or 'soft quality' aspects and highlighted the significance of 'hard quality' i.e. dependability aspects (Mittal and Lassar, 1998; McDougall and Levesque, 2000; Newman, 2001; Bell et al. 2005; Maddern et al., 2007). Thus, B2C findings of this research further provide empirical support to established literature arguing dependability as a key driver of customer satisfaction. B2C finding also leads to support the traditional 'trade-off theory' arguing that improvement in one element comes at the expense of the other.

However, on the other hand, B2B case findings argued that both dependability and quality are key drivers of customer satisfaction. This is aligned with the findings of Bhappu and Schultze (2006) and others (Mithas et al. 2005; Homburg and Fürst, 2005) who emphasized that for B2B customers performing well on both the relational and operational performance is necessary. B2B findings also opposes the traditional ‘trade-off theory’ concept and argues that simultaneous improvement of operational elements is possible. This directs towards the ‘sand cone model’ theory. The causal relationships between the dependability, quality and customer satisfaction was explored using Path Analysis method, a popular and established method for exploring causality. The findings from both B2B and B2C case studies was further included in the Meta-Analytic data base to check the consistency among the studies and to provide larger sample for the purpose of generalization of findings across the UK information sector. Cumulative Meta Analysis findings showed that all the case studies aiming to address same set of research question do not vary much from each other and thus provided support for generalization in information sector. A small variation between B2B and B2C cases was evident which suggested the differences in the priority offered to dependability and quality in the two types of information service firms.

In summary, the discussion presented above suggests that the research process design is a critical step in the research and one needs to be very careful in selecting the appropriate research methods. The use of a quantitative case study-based approach was deemed the most preferable and viable approach for this thesis under the given constraints of the access of data and timeline of this research. The discussion on the findings suggested that this thesis contributes to literature on service quality and service operations management and also provides further scope of research extension where emphasis could be given on further testing the ‘sand cone model’ theory in information services context. The Path Analysis and Cumulative Meta Analysis (CMA) method justified the findings of the primary data analysis. The strength of the CMA method lies in its ability to integrate the findings of other researchers attempting to explore the same research questions and provide support for generalization of the findings. Within the given time frame for this research, it was not possible to include the findings of other researchers and thus, CMA method can be used in future to include findings from different researchers and geographical locations to increase the generalisability of the findings across the information sector beyond the UK.

## **8.4 Contributions**

Through triangulation and reinforcement of the recent findings, this research has provided a much needed longitudinal perspective on service operations issues in information-service settings. The outcome of the research has a number of implications for both the academics and the practitioners. The upcoming sections will discuss the contributions in detail.

### **8.4.1 Theoretical contributions**

This research provides a comprehensive review of the literature available on the information economy and service operations management and, in the process, also examines the outcome advancing theory in the context of the information service settings.

Service quality issues have been addressed many times by researchers, as is highlighted in the literature reviews. However, these issues have not been explored in the information services context. In service quality and service profit chain literature much of the focus in the research has been placed on analysing the individual links, such as that between quality and customer satisfaction, dependability and customer satisfaction and so on. This research fills this gap and enhances our current understanding of the links between dependability, quality, speed, customer satisfaction and customer loyalty in the information services context.

The present work deals mainly with operations performance indicators - quality, dependability and speed (just in one case). The research adds to the theory by first addressing them from an operations performance perspective and then studying the combined impact of these indicators on customer satisfaction. The combined direct effect of these indicators on customer loyalty was then studied, an effect which is normally expressed in research through the mediating variables. Adding to the previous studies which analysed the impact of operations elements on customer loyalty, an important outcome of this research is that dependability is a key driver of customer loyalty. This represents a key finding of this research, as it not only adds to the knowledge and understanding of the driving forces of customer loyalty in information

services context, but also highlights how important dependability is in sustaining the overall performance of operations. In summary, this research tests the relationship between quality, dependability, customer satisfaction and customer loyalty which has already been established in literature and extends the theory by studying the combined effect of operations performance on customer satisfaction and customer loyalty in information service settings.

The investigation further extends the current theory, as not enough emphasis has been given to exploring the interrelationship among the operations performance indicators. This adds to the theory by first providing empirical evidence of an interrelationship between the dependability, quality and speed, and then goes on to provide an interesting insight into how important this combined effect can be in achieving satisfaction and loyalty. This is an important contribution, since literature ignores this interrelationship and its further impact on performance outcome measures.

The chapter containing the literature review argued, on the basis of an analysis of service quality literature, that quality is more significant than dependability. Findings from the research on B2C information service firms suggest however that dependability is a key factor affecting customer satisfaction. This challenges the dominance of the functional service quality and supports the work of researchers who argue that technical service quality i.e. dependability of service, is of more importance. The B2B case findings on the other hand argued that both operational elements are important in achieving customer satisfaction. These findings in the B2B and B2C information service firms further add to the theory and literature.

This research also provides further empirical support for several established models and propositions discussed in the service quality literature, such as the identification of key operations performance indicators, the link between quality and customer satisfaction, dependability, customer satisfaction and loyalty. Indeed, findings show that meeting the delivery promise was a significant factor in building a long-term relationship with the customers and possibility of recommendation of the firms to others.

B2B and B2C businesses are different and have different customer requirements. Therefore, addressing the service operations issues in information-driven B2B and B2C service firms further add to the existing body of literature and provide useful theoretical understandings. The outcome showed that, for B2C information service firms only,

dependability emerged as a key indicator of customer satisfaction. Dependability and quality however both emerged as key indicators of customer satisfaction in B2B service firms. In B2C information service firm dependability and quality shared a negative relationship whereas in B2B service firm they shared a positive relationship. Where B2C cases suggested that a trade-off exists between dependability and quality, B2B cases did not support this finding. This is a finding which adds further to the existing body of literature and shows the varying nature of relationships in different information business context.

Although the Meta-Analysis method has been used in management research for some time, but in this research Meta-Analysis method has been used in a new context of information services. This also represents a significant contribution to present theory as my research highlights how beneficial Meta Analysis method can be in management theory development processes. The next section will highlight the managerial implications of this research.

#### **8.4.2 Managerial Implications**

This research provides managers an understanding of the operations performance and its impact on customer satisfaction and customer loyalty. The research involved the participation of the firm's representatives during the data-sharing process. The outcome of the research was communicated to the firm's representatives regularly over the period of research. Throughout this thesis it has been highlighted that an understanding of the link between operations performance, customer satisfaction and loyalty is beneficial for business practitioners since this understanding can lead to improved performance and profitability for the firm. An understanding of these links in B2B and B2C information service settings moreover will further help managers to plan their strategies accordingly. Therefore, the outcome of this research can help business practitioners to plan their strategies, manage their resources efficiently and improve their operations performance capabilities that will ultimately result in the firm's profitability and gaining loyal and satisfied customers.

This research also shows that different elements or process that forms a service delivery system do not work in an isolated manner. More specifically, operations process involved in a service delivery system do impact each other, but not necessarily to the

same extent and in the same way. The results provide evidence that process related to the dependability of the delivery system have a strong impact on other elements of the system. The managerial implication of this is that optimising process to improve the dependability of a system is likely to produce better results in customer satisfaction and loyalty than the optimisation of other process related to other specific operational aspects of the delivery system. Although, a substantial improvement in quality must be achieved before firm focuses on improving dependability of their service. It is important to bear in mind that changes in some processes of a service delivery system do not necessarily guarantee improved performance of the delivery system as a whole. For instance, one of the findings suggests that the company under investigation (Case Study III) tends to increase lead time when dependability is affected negatively. This sort of change produces a palliative effect on customers' expectations only and it does not necessarily impact their loyalty or contribute to the overall performance of the delivery system.

This research provides business practitioners with an insight into the operations performance issues persisting in the information service sector and shows how they vary across B2B and B2C firms within the same sector. For the B2C firms only dependability emerged as a significant indicator of customer satisfaction whereas for the B2B firms both dependability and quality emerged as key indicators. B2C cases moreover gave evidence of a negative relationship between dependability and quality whereas B2B case studies pointed towards a positive relationship. Thus, where B2C cases advocated the existence of the 'trade-off' theory, on the other hand B2B cases opposed this and argued for a simultaneous improvement if firm focuses to improve quality first and after it reaches a certain level firm's focus can move on improving the dependability of the service while continuing to improve quality. Thus, improvements in both indicators (dependability and quality) are possible. This understanding allows the business practitioners to plan their strategies in order to focus on the operational element of more importance. The outcome of this research acts as a direction for business practitioners working in information-intensive firms to move beyond the traditional reliance on the findings of the service quality literature and re-assess and revise their operational strategies to build a strong base of satisfied and loyal customers.

### 8.4.3 Summary of Contributions

The research findings of this thesis indicate that dependability is a key performance indicator which affects customer satisfaction and loyalty in B2C information service firms whereas B2B studies indicates that both elements of operations performance significantly affect customer satisfaction. The findings of this research fill a gap within the literature in this field and provide a better understanding of the operations performance issues in an information services context. In summary, the outcome of the research makes the following contribution to the present theory and knowledge:

- Addressing the one aspect of service operations issues in the information economy context represents the originality of this research. This research therefore fills the contextual (information economy) gap of the research
- The thesis provides an insight into service operations issues by exploring the interrelationship among operations performance indicators in the context of the information economy which has so far not been given enough attention in the literature, thus making a valuable contribution to the literature in the information services context.
- The thesis builds a conceptual framework to explore the linkage between operations performance, customer satisfaction and customer loyalty. The empirical findings identify dependability as a critical operational element that affects customer satisfaction and loyalty significantly. This challenges the traditional priority afforded to the ‘soft quality’ (functional quality aspects) in SERVQUAL literature and argues that dependability i.e. hard quality factor is of as much importance as the functional quality.
- The thesis provides an insight into the causal relationship between the operations performance indicators and their further impact on customer satisfaction and loyalty. The findings also point out that the extent to which they affect the performance outcomes varies significantly in the B2B and B2C service settings. This provides an important theoretical understanding and at the same time provides business practitioners with an understanding of how their focus and



negligence on one or the other aspect of operations performance can lead to different outcomes.

- The findings from B2C case studies suggest that dependability is a key factor affecting customer satisfaction. Hence, this suggests that once substantial improvement in quality is achieved, the B2C information-service firms should focus on improving their dependability of the service. This adds to the literature on B2C information service firms.
- The findings of B2B firms insist that both operational elements (dependability and quality) are of prime importance and thus add to the literature on the B2B information service firms. This finding is of key importance for business practitioners, as this will have a crucial impact on the future business strategy of the B2B information-intensive firms.
- The findings also provides business practitioners an understanding of the service operations issues and their behaviour in different industrial scenarios (B2B and B2C), thus helping them to plan their operation strategies to focus on the operational element of more importance and have more satisfied and loyal customers.

The next section highlights the limitations associated with this research.

## **8.5 Limitations**

Although this research makes both theoretical and managerial contributions, like any other research it also has certain limitations. Limitations are usually confined within the boundaries of context, geography/location, methods, sample size, sample type, applicability and so on. Most of the research is restrained by either one or some of these limitations. This research is no different from others and inherits some limitations. The following is a description of these limitations:

- The empirical investigation of this thesis is limited to two operations performance indicators (dependability and quality) except only in one case study

where three operations performance indicators (dependability, quality and speed) were investigated. The missing 'speed' variable in the rest of the case studies was due the limitations imposed by the secondary data set, since the rest of the firms under investigation did not measure this operational performance construct.

- The research findings are limited to the information sector in the UK since all case studies were taken from the UK-based information service firms. Findings therefore need to be tested on the cases taken from the different geographical locations around the world to generalize the findings across the information sector.
- The Meta-Analysis method normally summarises the findings of the other researchers in order to reach a conclusion. Nevertheless, this research does not include any other studies apart from the cases being investigated in this thesis. This was done intentionally however because the aim of using Meta Analysis was just to investigate the consistency among the five cases research findings. To explore completely the power of Meta Analysis and provide strong justification of the findings across the information sector one needs to include the research findings from other case studies.
- Researchers such as Basu (2005) argue that the random effect model should be preferred only if the test of heterogeneity is significant. This thesis uses the random effect model for the purpose of analysis, although the test of heterogeneity was found to be insignificant. The selection of random effect model was however for the generalisation of the conclusions beyond the studies included in the Meta Analysis.
- This research is limited to the findings from five case studies from B2B and B2C information service firms operating in the UK. The number of case studies being investigated however was restricted due to the time constraint and a lack of accessibility to the secondary data set from other information-service firms. Nevertheless the addition of a greater number of case studies from both B2C and B2B firms will offer more reliable case study research findings capable of greater generalisation.

- The finding is limited to the data set ranging between 24-60 months time frame. Having richer data set over the longer period and from multiple sources will further increase the reliability of the findings.
- This thesis uses secondary longitudinal time series data collected by the firms or by the data collection agencies. Although considerable time was given to get familiar with the secondary data set, the chances of there being some missing information cannot be ignored.
- The time frame over which the data was collected was not the same across each case. Two sets of data were collected over a 24 months to 60 months time frame whereas the rest of the data sets were collected over a 24 months time frame. The secondary nature of the data restricted this research to rely on the data set collected by the selected firms for the specific period of time.
- Measuring the constructs on multi-scale items reduces the bias and satisfies the reliability and validity issues. However, the constructs used in all the cases were not measured using multi-scale items. Therefore, the weakness of the secondary data set imposed another limitation over the measurement of variables on a multi-scale item and this research had to deal with some of the construct measured on a single scale item i.e. the way they were measured by the respective firms.

## **8.6 Future Research Directions**

This thesis provides a much needed insight into the service operations issues in the context of information service settings. The service economy is a mix of material and information-service-based economies. Substantial growth in the information economy over the last couple of decades and its contribution to GDP in most of the developing economies has changed the business scenario. Despite this fact academic practitioners have not published a sufficient quantity of research in this context. Although an emerging body of literature published in the last few years in the information economy context was evidenced. This urges academics to bring their attention to this area and fill

this research gap by addressing service operations issues in an information economy perspective.

This thesis represents an attempt to fill the gap within the research which exists on the information economy. The established theories were tested from the service quality and service operations management literature in the information service settings. The thesis also addresses some of the research gaps, such as the combined impact of operations performance indicators on customer satisfaction, the interrelationship between the operations performance indicators and the identification of the relative effect of quality and dependability in B2B and B2C information service firms. A longitudinal time series data set was analysed using a multiple case study method. In addition the Cumulative Meta Analysis method was used to combine the findings of all the five cases and to provide support for the generalization of findings across information processing firms. Apart from investigating some key issues that have both academic and managerial implications this research highlights some specific areas for further investigation. Some of the future research directions are detailed below:

- Future research can involve investigation of research questions through qualitative study. The data collected from surveys and interviews in the qualitative research will also help to gain an inside perspective on firms by interviewing the management team and staff members.
- Although this thesis used multiple case studies to investigate the research questions, the growing popularity of a mixed methods approach in management research proposes the use of this method to validate further the findings from both qualitative and quantitative aspects. This will also help to overcome some of the shortcomings of the case study method.
- Use of secondary data posed some limitations in this research and this limitation can be overcome by collecting real time data from the information- service firms through surveys and interviews.
- In this thesis a total of five information processing firms from B2B and B2C sectors were chosen for research. For justification and generalisation purposes however more cases from different geographical locations are required. Further

work is therefore needed to explore the service operations issues in information service settings involving more cases from different B2B and B2C firms and from different geographical locations over a longer period of time.

- The present study is limited to just three operations performance indicators and future research may need to involve additional performance indicators such as flexibility and cost.
- The findings of this research strongly suggest that the traditional ‘trade-off’ theory applies in B2C firms. B2B case study findings however pointed towards the ‘Sand Cone Model’ theory. Therefore future research should be aimed at exploring the viability of these two broadly dominating theories using a greater number of case studies from B2B and B2C information-service firms.
- Additionally any related research outcomes in the future should be included in the Meta-Analysis to justify the findings of the multiple case studies obtained in this thesis.

In summary, the findings provide a platform for future research on the design of service delivery systems, a move towards more holistic approaches which are not constrained by activities limited by the customer.

## Appendices:

<b>Appendix A: Application of SERVQUAL in service settings</b>	
Dalrymple et al. (1995)	Applied SERVQUAL to measure the service quality in two Scottish Government service: Public Libraries and Home Help provision
Cuthbert (1996)	Uses SERVQUAL tool to measure service quality in Higher Education
Angur et al. (1999)	Indicates the importance of SERVQUAL tool in banking industry
Bryslan and Curry (2001)	Applied SERVQUAL model in number of public service environments to assess the quality of service provision in terms of customer's expectation and perception of service
Kang et al. (2002)	Assesses the transferability of SERVQUAL tool for measuring internal service quality
van der Wal et al. (2002)	Uses SERVQUAL tool to measure service quality at cellular retail outlets in South Africa
Johnson and Sirikit (2002)	Highlights the reliability of SERVQUAL tool in measuring service quality in Thai telecommunication industry
Sohail (2003)	Investigates service quality in Malaysian Hospitals using SERVQUAL tool
Gounaris et al. (2003)	Investigates the antecedents of service quality in banking industry using SERVQUAL tool
Baldwin and Sohal (2003)	Uses SEVQUAL tool in measuring service quality in Dental Health Care system
Kilbourne et al. (2004)	Uses four dimension SERVQUAL model (responsiveness, reliability, empathy and tangibles) in health care system to measure resident's perceptions of long term health service quality in USA and UK
Badri et al. (2005)	Utilizes SERVQUAL tool to identify the gaps in the chain of services provided by the information technology (IT) resources
Jabnoun and Khalifa (2005)	Develops a measure of service quality using SERVQUAL tool and tests in UAE conventional and Islamic banks
Akbaba (2006)	Uses SERVQUAL tool to measure service quality in a business hotel in Turkey
Donnelly et al. (2006)	Uses SERQVUAL approach to assess the quality of service in Strathclyde Police in Scotland
Christoglou et al. (2006)	Highlights the utility of SERVQUAL tool in the patient service quality survey in General Hospital of Katerini in Greece
Kiatcharoenpol and Laosirihongthong (2006)	Uses SERVQUAL Model to evaluate the service quality of Airline Service Operations and based on the findings they recommended re-designing of the current airline service operations
Pakdil and Aydin (2007)	Uses SERVQUAL model to evaluate the Turkish airline service quality and highlights the importance of

	responsiveness of services
Lai et al. (2007)	Applied SERVQUAL tool in the China's mobile communication setting to assess its reliability and validity
Stodnick and Rogers (2008)	Uses SERVQUAL tool to measure the quality of classroom experience. Their results indicate that SERVQUAL tool outperforms traditional student assessment scales, and that the tool was also capable of explaining the significant amount of variance in student-related outcome variables, such as satisfaction and learning.
Meng and Zhang (2008)	Apply SERVQUAL tool to measure the service quality of the telecommunication enterprises
Ahmed and Shoeb (2009)	Uses SERVQUAL tool to measure service quality of a public library in Bangladesh
Baki et al. (2009)	Measures strengths and weaknesses of logistics services of a well known cargo company in Turkey using SERVQUAL tool
Chang (2009)	Uses SERVQUAL to assess the travellers' perceptions of service quality on the guided package tour in Taiwan and reports that the dimension of 'tangibility' was less significant as compared to other dimensions in terms of customers' perceptions of service quality. Also other elements such as 'communication' and 'sociability' were critical when applied to the travel industry in a particularly ethnical group.

<b>Appendix B: Researchers Favouring Relational/FSQ Dimension</b>	
Grönroos (1983) Grönroos (1984) Parasuraman, Zeithaml and Berry (1985; 1988) Saleh and Ryan (1991) Sweeny et al. (1997) Brogowicz et al. (1990)	Argues in their service quality model that functional quality is more important than technical quality
Oberoio and Hales (1990) Silvestro and Johnston (1990) Higgins and Ferguson (1991)	They identified functional service quality as a main contributor to service quality.
Boulding et al. (1993)	They argued that a person's overall quality perception is predicted by their intended behaviour.
Baker and Lamb, 1993; Mangold and Babakus, 1991; Richard and Allaway, 1993)	They criticized the focus of SERVQUAL on a functional dimension
Powpaka, (1996); Richard and Allaway (1993)	They utilized the SERVQUAL instrument to measure the functional quality dimension
Zeithaml and Bitner (2000)	They also strengthen the SERVQUAL

	assumption that ‘service quality pertains to expressive attribute of a service product’.
Woodall (2001)	He also supports the notion that SERVQUAL ‘implicitly favours the functional’.
Brady and Cronin (2001)	They highlight that focus on functional quality attributes is referred to as the American perspective of service quality

<b>Appendix C: Researchers Favouring Core Quality/TSQ Dimension</b>	
Mittal and Lassar (1998)	Highlights that in a low contact service wherein a customer's direct contact with the service provider was relatively intense technical quality significantly and positively affected satisfaction. Technical quality also found to affect customer loyalty in the high contact service
Lassar et al. (2000)	In a study of private banking customers, find a much stronger relationship between technical quality and satisfaction than functional quality and satisfaction.
McDougall and Levesque (2000)	Argues that core service quality (the promise) and perceived value were the most important drivers of customer satisfaction with relational service quality (the delivery) a significant but less important driver.
Newman (2001)	Addresses that ‘soft quality’ is no compensation for inadequate ‘hard quality’ and that effective delivery on ‘hard’ factors is a necessary precondition for overall service quality.
Driver and Johnston (2001)	Argues that for any particular service, there could be two significantly different groups of customers: non relaters who consider hard (non interpersonal) service quality to be more important than soft (interpersonal) service quality and relaters who consider soft service quality to be more important than hard service quality.
Bell et al. (2005)	Technical service quality is hypothesized to be a more important determinant of customer loyalty than functional service quality as expertise increases.
Maddern et al. (2007)	Suggests that at the very least TSQ is as important as FSQ in determining customer satisfaction.



Lin (2007)	Their study concluded that higher the difference in culture is, the higher the technical quality will be in performance.
Kumar et al. (2008)	Argues that Technical Service Quality is of more importance in driving customer satisfaction.

<b>Appendix D: Sample of Customer satisfaction and Quality data for Case Study I</b>							
	<b>Aug 00</b>	<b>Sep 00</b>	<b>Oct 00</b>	<b>Nov 00</b>	<b>Dec 00</b>	<b>Jan 01</b>	<b>Feb 01</b>
<b>PERSONAL BANKING OVERALL</b>							
Personal CARE index	63.8	64.5	65.2	64.5	64.6	65.1	64.2
Personal Overall Service Quality	66.1	67.0	67.7	66.9	67.3	67.8	66.8
Personal Customer Understanding	60.8	61.4	62.2	61.5	61.3	61.7	61.0
Personal Accessibility	64.5	64.8	65.0	64.4	64.3	65.0	63.7
Personal Responsibility	58.5	59.0	59.8	59.6	59.3	59.9	58.6
Personal Expertise	63.5	64.0	64.6	63.9	63.9	64.3	63.5
	<b>Nov 01</b>	<b>Dec 01</b>	<b>Jan 02</b>	<b>Feb 02</b>	<b>Mar 02</b>	<b>Apr 02</b>	<b>May 02</b>
<b>PERSONAL BANKING OVERALL</b>							
Personal CARE index	62.9	62.9	63.2	64.4	63.9	65.6	64.4
Personal Overall Service Quality	65.6	65.6	65.8	66.7	66.5	67.8	67.2
Personal Customer Understanding	60.3	60.6	60.7	61.2	60.7	63.2	61.3
Personal Accessibility	60.5	60.5	62.0	64.3	62.6	65.3	62.9
Personal Responsibility	58.2	58.1	58.0	59.5	58.6	60.6	59.2
Personal Expertise	62.8	62.7	62.0	63.5	63.1	64.6	63.0

<b>Appendix E: Dependability data (% Service Level Agreements (SLA)) (Group Operations Jan 02 – Dec 04)</b>	
<b>Period</b>	<b>% SLA achieved</b>
q1 2002	0.604651
q2 2002	0.665733
q3 2002	0.703515
q4 2002	0.777778
q1 2003	0.790724
q2 2003	0.739130
q3 2003	0.848039
q4 2003	0.848701
q1 2004	0.925803
q2 2004	0.905096
q3 2004	0.920875
q4 2004	0.917258

<b>Appendix F: Data set for the Case Study II (B2C)</b>			
<b>Year</b>	<b>Quality</b>	<b>Dependability</b>	<b>Customer Satisfaction</b>
<b>Jan-06</b>	195.34	75.00	69.80
<b>Feb-06</b>	197.97	75.00	69.80
<b>Mar-06</b>	197.97	75.00	69.80
<b>Apr-06</b>	228.44	76.61	75.60
<b>May-06</b>	228.44	76.61	75.60
<b>Jun-06</b>	228.44	76.61	75.60
<b>Jul-06</b>	203.46	77.39	72.10
<b>Aug-06</b>	203.46	77.39	72.10
<b>Sep-06</b>	203.46	77.39	72.10
<b>Oct-06</b>	229.41	76.53	65.00
<b>Nov-06</b>	255.65	72.00	69.38
<b>Dec-06</b>	232.59	70.40	66.66
<b>Jan-07</b>	239.91	71.71	66.66
<b>Feb-07</b>	230.51	73.19	69.38
<b>Mar-07</b>	204.56	76.28	71.71
<b>Apr-07</b>	241.39	74.73	72.44
<b>May-07</b>	193.21	73.73	67.01
<b>Jun-07</b>	202.58	74.22	71.71
<b>Jul-07</b>	220.67	76.69	69.90
<b>Aug-07</b>	222.99	62.50	54.63
<b>Sep-07</b>	238.50	74.48	65.30
<b>Oct-07</b>	234.35	69.69	64.64
<b>Nov-07</b>	216.08	59.79	55.10

### Appendix G: Snap shot of the data set for Case Study III

Month-Year	Dependability(A1P)	Quality	Speed (Avg. Lead Time)	Loylaty (Likelyhood of Reccomendation)
Apr-03	0	0	0	0
May-03	0	0	0	0
Jun-03	0	0	0	0
Jul-03	0	0	0	0
Aug-03	0	0	0	0
Sep-03	0	0	0	0
Oct-03	0	0	0	0
Nov-03	0	0	0	0
Dec-03	0	0	0	0
Jan-04	0	0	0	0
Feb-04	0	0	0	0
Mar-04	0	0	0	0
Apr-04	84.6	0	0	25.1
May-04	85.8	0	0	25.4
Jun-04	88.3	0	0	27.6
Jul-04	87.3	32.53	0	28
Aug-04	86.4	32.34	0	27.8
Sep-04	86.2	32.6	0	28.2
Oct-04	85.8	32.43	0	26.5
Nov-04	84.2	32.22	22.4	26.5
Dec-04	85.5	32.02	21	28.3
Jan-05	85.5	31.91	16.5	29.9
Feb-05	83.5	32.6	17.5	29.4
Mar-05	84.9	32.44	16.5	28.5
Apr-05	86.2	32.88	14.7	31.9
May-05	86.6	32.63	13	30.2
Jun-05	83.7	32.36	13.2	29.6
Jul-05	80.5	32.38	16.4	28.9
Aug-05	81.4	32.57	18.5	29.7
Sep-05	82	32.39	17.6	29.7
Oct-05	83.6	32.1	16.2	20.9
Nov-05	80.9	31.56	17.9	29.5
Dec-05	80.3	31.8	21.1	29.6

<b>Appendix H: Quality data for Case Study III</b>					
<b>Year</b>	<b>Trustworthy</b>	<b>Helpful</b>	<b>Inspiring</b>	<b>Straightforward</b>	<b>Heart</b>
<b>Apr-04</b>	7.42	7.00	5.46	6.28	6.17
<b>May-04</b>	7.24	6.81	5.30	6.05	6.17
<b>Jun-04</b>	7.30	6.89	5.31	6.11	6.14
<b>Jul-04</b>	7.27	6.67	5.14	6.06	6.06
<b>Aug-04</b>	7.35	6.89	5.53	6.44	6.44
<b>Sep-04</b>	7.22	6.79	5.42	6.15	6.15
<b>Oct-04</b>	7.12	6.70	5.30	6.08	6.08
<b>Nov-04</b>	7.22	6.87	5.34	6.17	6.17
<b>Dec-04</b>	7.23	6.52	5.34	5.95	5.95
<b>Jan-05</b>	7.34	7.00	5.58	6.44	6.44
<b>Feb-05</b>	7.31	7.00	5.42	6.34	6.34
<b>Mar-05</b>	7.39	7.01	5.54	6.24	6.37
<b>Apr-05</b>	7.36	6.91	5.46	6.19	6.24
<b>May-05</b>	7.26	6.72	5.21	5.96	6.03
<b>Jun-05</b>	7.39	6.94	5.48	6.21	6.36
<b>Jul-05</b>	7.38	6.88	5.41	6.18	6.21
<b>Aug-05</b>	7.25	6.76	5.38	6.13	6.23
<b>Sep-05</b>	7.28	6.82	5.40	6.16	6.16
<b>Oct-05</b>	7.23	6.78	5.23	5.94	6.09
<b>Nov-05</b>	7.23	6.83	5.35	6.03	6.20
<b>Dec-05</b>	7.36	6.86	5.43	6.15	6.22
<b>Jan-06</b>	7.23	6.82	5.51	6.19	6.23
<b>Feb-06</b>	7.27	6.90	5.47	6.18	6.28
<b>Mar-06</b>	7.27	6.91	5.49	6.32	6.27

## Appendix I: Snap shot of the data set from the Utility Firm

Question	Q#	Month	Quart	Market	Branch	In the month
						Base No.
Q12 5. Staff were polite and helpful	Q12 5	P01 Jan06	Q106	02 Mass Market	01 Networks	16
Q12 1. I was able to easily contact them to find out about	Q12 1	P01 Jan06	Q106	02 Mass Market	01 Networks	14
Q12 2. My telephone call was answered within a reasonable	Q12 2	P01 Jan06	Q106	02 Mass Market	01 Networks	13
Q12 3. They were able to provide sufficient information	Q12 3	P01 Jan06	Q106	02 Mass Market	01 Networks	14
Q12 4. The information they provided was accurate	Q12 4	P01 Jan06	Q106	02 Mass Market	01 Networks	14
Q12 5. Staff were polite and helpful	Q12 5	P01 Jan06	Q106	02 Mass Market	01 Networks	12
Q12 1. I was able to easily contact them to find out about	Q12 1	P01 Jan06	Q106	02 Mass Market	01 Networks	7
Q12 2. My telephone call was answered within a reasonable	Q12 2	P01 Jan06	Q106	02 Mass Market	01 Networks	6
Q12 3. They were able to provide sufficient information	Q12 3	P01 Jan06	Q106	02 Mass Market	01 Networks	7
Q12 4. The information they provided was accurate	Q12 4	P01 Jan06	Q106	02 Mass Market	01 Networks	7
Q12 5. Staff were polite and helpful	Q12 5	P01 Jan06	Q106	02 Mass Market	01 Networks	6
Q12 1. I was able to easily contact them to find out about	Q12 1	P01 Jan06	Q106	02 Mass Market	01 Networks	8
Q12 2. My telephone call was answered within a reasonable	Q12 2	P01 Jan06	Q106	02 Mass Market	01 Networks	8
Q12 3. They were able to provide sufficient information	Q12 3	P01 Jan06	Q106	02 Mass Market	01 Networks	8
Q12 4. The information they provided was accurate	Q12 4	P01 Jan06	Q106	02 Mass Market	01 Networks	8
Q12 5. Staff were polite and helpful	Q12 5	P01 Jan06	Q106	02 Mass Market	01 Networks	8
Q2A 7. I have received a good level of customer service	Q2A 7	P01 Jan06	Q106	02 Mass Market	01 Networks	85
Q9. Overall, how would you rate the reliability of the electric	Q9	P01 Jan06	Q106	02 Mass Market	01 Networks	160
Q12A. The response and the overall time taken to restore	Q12A	P01 Jan06	Q106	02 Mass Market	01 Networks	50
Q9. Overall, how would you rate the reliability of the electric	Q9	P01 Jan06	Q106	02 Mass Market	01 Networks	75
Q12A. The response and the overall time taken to restore	Q12A	P01 Jan06	Q106	02 Mass Market	01 Networks	28

<b>Appendix J: Data Set for Case Study IV (B2B)</b>			
<b>Year</b>	<b>Quality</b>	<b>Dependability</b>	<b>Customer Satisfaction</b>
<b>Jan-06</b>	47.00	40.70	48.00
<b>Feb-06</b>	47.00	40.70	48.00
<b>Mar-06</b>	47.00	40.70	48.00
<b>Apr-06</b>	99.00	51.09	54.00
<b>May-06</b>	00	51.09	54.00
<b>Jun-06</b>	00	51.09	54.00
<b>Jul-06</b>	00	62.92	54.55
<b>Aug-06</b>	00	62.92	54.55
<b>Sep-06</b>	00	62.92	54.55
<b>Oct-06</b>	00	99.00	99.00
<b>Nov-06</b>	00	69.57	67.33
<b>Dec-06</b>	00	99.00	99.00
<b>Jan-07</b>	00	81.82	72.73
<b>Feb-07</b>	00	68.75	82.35
<b>Mar-07</b>	00	66.67	66.67
<b>Apr-07</b>	00	63.16	64.10
<b>May-07</b>	00	72.00	59.26
<b>Jun-07</b>	00	69.70	78.79
<b>Jul-07</b>	51.52	76.47	67.65
<b>Aug-07</b>	59.38	58.06	68.75
<b>Sep-07</b>	50.00	45.45	61.76
<b>Oct-07</b>	90.00	70.00	80.00
<b>Nov-07</b>	57.14	65.38	69.64

<b>Appendix K: Data Set for Case Study V (B2B)</b>			
<b>Year</b>	<b>Quality</b>	<b>Dependability</b>	<b>Customer Satisfaction</b>
<b>Jan-06</b>	47.00	40.69	69.54
<b>Feb-06</b>	47.00	40.69	69.54
<b>Mar-06</b>	47.00	40.69	69.54
<b>Apr-06</b>	00	51.08	67.49
<b>May-06</b>	00.00	51.08	67.49
<b>Jun-06</b>	00.00	51.08	67.49
<b>Jul-06</b>	00.00	62.92	73.88
<b>Aug-06</b>	00.00	62.92	73.88
<b>Sep-06</b>	00.00	62.92	73.88
<b>Oct-06</b>	00.00	60.53	70.86
<b>Nov-06</b>	00.00	69.56	71.35
<b>Dec-06</b>	00.00	60.53	74.43
<b>Jan-07</b>	00.00	81.81	71.05
<b>Feb-07</b>	00.00	68.75	75.33
<b>Mar-07</b>	00.00	66.66	72.39
<b>Apr-07</b>	00.00	63.15	80.00
<b>May-07</b>	00.00	72.00	68.80
<b>Jun-07</b>	00.00	69.69	71.21
<b>Jul-07</b>	51.51	76.47	72.54
<b>Aug-07</b>	59.37	58.06	68.79
<b>Sep-07</b>	50.00	45.45	78.00
<b>Oct-07</b>	0.00	70.00	75.82

## Appendix L: List of Publications during the tenure of Doctoral Research

### Journal Papers

**Kumar, V.**, Batsista, L .C. and Maull, R. S., (2011), The Impact of Operations Performance on Customer Loyalty, Service Science Journal, 3 (2), pp. xx-xx (In print)

**Kumar, V.**, Smart, P.A., Maddern, H. and Maull, R. S., (2008), Alternative Perspectives on Service Quality and Customer Satisfaction: The Role of BPM, International Journal of Service Industry Management, Volume 19, Number 2., 176 – 187

### Conference Papers

**Kumar, V.** and Maull, R. S., (2-5<sup>th</sup> June 2011), Operations performance and performance outcome link in B2B and B2C information services, QUIS12 (The 12th International Research Symposium on Service Excellence in Management), Center for Hospitality Research, Cornell University, Ithaca, New York, USA , June 2-5, 2011 (Accepted)

**Kumar, V.** and Maull, R. S., (9-11<sup>th</sup> June, 2010), What is strategically more critical for B2C and B2B information service firms: dependability or quality? Yeditepe International Research Conference on Business Strategies (YIRCoBS'10), Jul 2010, Istanbul, Turkey, Conference Proceeding

**Kumar, V.**, Smart, P.A., Maull, R. S. and Maddern, H. (14<sup>th</sup> June 2007), Analysing the role of BPM in driving customer satisfaction, The 10th International Research Symposium on Service Excellence in Management (QUIS 10) University of Central Florida, Orlando, Florida, US, June 14-17, 2007 (**Best Paper Award**)

**Kumar, V.**, Madern, H. Maull, R.S. and Smart, P. A, (21<sup>st</sup> December 2006), Analysing the Drivers of Customer Satisfaction using Structural Equation Modelling, ACSOM Conference (IIM-A, India), ACSOM conference proceedings

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