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The Impact of ERP Deployment upon Organizational Structure: A Mixed Method Study of Chinese Practices

By
Leitao Wang
The Business School,
Loughborough University

A thesis submitted to the
Business School of Loughborough University
in partial fulfilment of the requirements
for the award of
the degree of Doctor of Philosophy
of Loughborough University

December 31, 2007
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No complex project, such as studying for a PhD, could be done by any one individual, without the support, help and encouragement of many others. I was very lucky to be given invaluable support, over the past five years, whilst pursuing my academic dreams. So there are so many people to whom I need to pay special thanks.

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It is also important to pay my respects and thanks to all the many people who participated in this study. I am very grateful for the time and effort that you were all able to devote to this project, which has greatly contributed to its ultimate value.

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Abstract

Information technology (IT) plays an important role in the daily operation of the modern business organization. The implications for, and influences on organizational structure from the deployment of IT have long been recognized. One of the most important, recent innovations, in the world of information technology, has been the Enterprise Resource Planning (ERP) system. Because of its wide reach, sophistication and highly integrated nature, it is potentially far more powerful and advanced than any of its predecessors, and thus has the potential to greatly influence organizational practices and design. However, the understanding of the organizational impact of IT in general, and ERP in particular, is rather limited. Due to the shortcomings of past studies, no clear consensus has been reached with respects to the structural impact of IT. Moreover, though there have been a large number of studies focusing on the implementation of ERP, very few empirical works have explicitly and systematically explored the influence of ERP on a range of different structural dimensions.

This study aims to fill these gaps in the literature, and in so doing, generate a more comprehensive understanding of the organizational impacts of ERP. To this end, it adopted a mixed method in order to deliver a more balanced and richer set of conclusions. The outcomes of the quantitative data analysis confirmed the general influences of ERP on a range of different structural dimensions. More specifically, it has been shown that the deployment of ERP can lead to a flatter, more decentralized, more standardized and a more tightly integrated organizational structure. Furthermore, the qualitative data provided meaningful insight into the structural impact of ERP, in Chinese context. In addition, the various analyses found important associations amongst the corporate strategy, organizational structure, ERP deployment and organizational flexibility constructs, and in so doing, demonstrated that the relationship between ERP deployment and organizational structure is not independent of its organizational context. Indeed, it is shown that the results of this study provide support for the 'configurational' view of organizational strategy and behaviour. Finally, this study's results have been strengthened by modelling the technological artefact using a more balanced set of measures than had been employed in previous studies. Indeed, it was demonstrated that the use of ERP success, rather than the scale of its adoption, to model the independent variable, was a more effective indicator of changes to structural design, and ultimately also to the realization of organizational flexibility.

Key Words

Information Technology (IT); Enterprise Resources Planning (ERP); Organizational Structure; China; Centralization; Standardization; Configuration; Strategy; Flexibility.
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<td>BPR</td>
<td>Business Process Reengineering</td>
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<td>Chief Executive Officer</td>
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<td>CIO</td>
<td>Chief Information Officer</td>
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<td>CSFs</td>
<td>Critical Success Factors</td>
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<td>DP</td>
<td>Data Processing</td>
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<td>Decision Supporting System</td>
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<td>Enterprise Resources Planning</td>
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<td>Foreign Owned Enterprises</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>State Owned Enterprises</td>
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<td>Total Quality Management</td>
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Chapter 1

Introduction
Chapter 1—Introduction

1.1 Background

1.1.1 The Importance of the Organizational Impact of IT

Since the 1950s managers have recognized the potential for Information Technology (IT) to impact upon the day to day processes of organizational life. Because of its critical role in support of the day to day operations and the strategic positioning of the modern business enterprise, information technology has become a ubiquitous and increasingly significant part of the fabric of most organizations. Consequently, the implementation of information technology within organizations almost invariably results in a wide variety of, often very significant, impacts upon the design of the business, its economic performance and the working conditions of members of staff (Markus & Robey, 1988; Clegg et al, 1997; Doherty & King, 2001).

The study of the organizational impacts of IT is not new; it is about fifty years since Herbert Simon first turned his attention to investigating the influence of IT on organizations (Simon 1957; March and Simon 1958; Simon 1959; Simon 1960; Simon and Newell 1960; Simon 1965; Simon 1977). Inspired by his work, other researchers also began to investigate the organizational impact of IT (Hoos 1960; Burlingame 1961; Likert 1961; Simon 1965; Mumford and Ward 1968; Whisler 1970; Child and Mansfield 1972; Cooper 1972; Nolan 1973). For example, Leavitt and Whisler (1958), in their seminal paper, predicted that information technologies were likely to: 'change the role and scope of middle managers' and encourage 'large organisations to recentralise'. Since then, there has been a steady flow of empirical and conceptual studies that have explored the impact of a variety of types and configurations of information technology on a range of different structural characteristics (Land 1984; Yetton 1984; Pinsonneault and Kraemer 1993a; Crowston and Malone 1994; Thong and Yap 1995; Nah et al. 2004). Once implemented, IT will impact on the enterprise's organizational structures (Donaldson 1976; Fry 1982; Alexander and Randolph 1985; Tavakolian 1989; Crowston et al. 2001) and other organizational elements too, such as the organization's strategic potential and its flexibility (Tavakolian 1989; Barnatt 1996; Karimi et al. 1996; Segars 2002; Reimers 2004; Amrani et al. 2006).

The impact of IT upon organizational structure is a critical area for research, as the design of an organization's structure can have a significant influence upon its overall performance. More specifically, organizational structure is employed to combine,
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coor-dinate and integrate the work of individual employees, in order to pursue and realize shared objectives (Child 1969; Pfeffer 1978; Child 1984). Consequently, without a properly arranged and managed organizational structure, employees might not be able to realize their objectives, and organizational performance will suffer. Moreover, organizational structure can directly contribute to the realization of organizational strategy (Galbraith and Nathanson 1978; Mintzberg and McHugh 1985). The organizational structure determines the flow of information through a company, setting up responsibilities for communication channels and facilitating managerial control, which are all required in order for a strategy to be effectively and efficiently implemented (Galbraith 1975; Galbraith and Nathanson 1978; Pfeffer 1978; Mansfield 1984; Cyert and March 1992; Galbraith 1994). IT also plays an important role in supporting the maintenance of the organizational structure. As Orlikowski (1996) has also argued, IT can influence the design of organizational structure through the different working practices, such as changed decision making processes and structures, which new applications, such as ERP, encourage within the workplace.

There has been a great deal of academic interest in the impact of IT on organizational structure, and to a far lesser extent, the impact of ERP upon structure. However, the focus of most of this prior research has been relatively narrow, with the potential of IT to modify the way that decision making is undertaken being a very common theme (e.g. Robey, 1977; Pinsonneault and Kraemer 1993a; Hitt & Brynjolfsson, 1997). Another reasonably common theme in the organizational literature has been the impact that IT implementation has on the standardization and formalization of working practices and procedures (e.g. Wijnhoven & Warssener, 1990; Spanos et al, 2002), although such studies have tended to address centralization too. By contrast, the impact of IT on other important dimensions of organizational structural - such as the span of control, the degree of horizontal integration, or the number of hierarchical layers - has been rather neglected. This partial and narrow focus of previous studies means that it is difficult to get an overall and holistic view of the impact of IT in general or ERP, in particular, on organizational structure (Robey, 1981).

This literature is discussed in detail in Chapter Two, where it is argued that the organizational structure channels the flow of information and communication throughout the enterprise. Consequently, it is particularly important to consider the impact that the implementation of new software applications, which are likely to
modify the flow of information, might have upon organizational structure. Moreover, it is argued that previous research has been significantly limited by researchers taking into account too few of the complexities surrounding the impact of IT, and through inadequate assessment of the impact of IT on the full range of different organizational features. Perhaps more importantly, it is argued that there have been far too few empirical studies explicitly addressing the impact of ERP upon organizational structure. Indeed, this gap in the literature is particularly worrying, as these enterprise-wide systems have unique characteristics that make their impacts upon the organizational design, unusually complex and wide ranging, as briefly discussed below.

1.1.2 The Importance of EPR Systems

Enterprise Resource Planning (ERP) software has become one of most popular IS packages available. ERP was developed in the late 1980s (Chung and Snyder 2000), and is capable of connecting nearly all business functions through a central database (Callaway 1999). This application area evolved from Manufacturing Resource Planning (MRP and MRP II) software and indeed MRP is still regarded as the core part of the production module of ERP (Sheikh 2003). For this reason ERP is often regarded as being particularly applicable to manufacturing companies, although ERP has also been applied in various industries such as services and agricultural industries (Klaus et al. 2000).

ERP software offers capabilities to support automation, transmission, communication and management decision making, in a similar way to traditional official automation software such as management information systems (MIS) or decision support systems (DSS). But, ERP is intended to also link business processes together (Klaus et al. 2000). To some extent, ERP represents the idea underpinning Business Process Re-engineering (BPR) (Keller and Teufel 1998; Scheer and Habermann 2000). Davenport (2000) also suggests that ERP has been designed to support management ‘best practices’ and so can underpin a process re-engineering initiative to improve efficiency and effectiveness (see also: Agarwal et al. 2000; Sammon and Adam 2005; Koh et al. 2006; Muscatello and Parente 2006; Woo 2007).

The complexity and the cost associated with the implementation and maintenance of ERP are unprecedented (Poston et al. 2000; Hall 2002; Ragowsky and Somers...
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2002; Carton and Adam 2003; Muscatello et al. 2003; Beard and Summer 2004; He 2004; Ettlie et al. 2005), such an initiative demands enormous human and financial resources. The adoption of ERP, to a large extent, indicates the strategic initiative and aggressiveness of the adopters (Kennerley and Neely 2000; Chen 2001; Beard and Summer 2004; He 2004; Laframboise and Reyes 2005). Consequently, the success of ERP system has significant implications for the ERP adopters.

1.1.3 Investigating the Impact of ERP Systems

It was envisaged that ERP technology would make an excellent focus for this study, as not only does it present a single and well defined type of software application, which is increasingly common, but also the potential of ERP to engender significant organizational impacts has been widely recognized. For example, Markus (2004) has argued the introduction of a highly integrated ERP system, within a manufacturing company, is likely to have a significant impact on that organization's business processes, structure, culture and enterprise level performance, as well as the motivation, job specifications and performance of individual employees. Moreover, whilst the impact of ERP on organizational structure has been widely recognized (Fahy 2001), there has to date, been very little empirical analysis to ascertain the nature, form and circumstances of such structural impacts. A further justification for choosing to focus upon the impacts of ERP systems, for the purposes of this study is that due to their relatively low 'interpretive flexibility' (Doherty et al, 2006), there was a reasonable chance that any resultant impacts would reflect a relatively high degree of commonality, across a sample of manufacturing organizations. As Kallinikos (2004a; p11) notes: ‘contextual adaptation and re-shaping of such packages [ERP systems] cannot undo the logic and very pre-suppositions on which the package is predicated’.

1.1.4 The Special Attention to Chinese Context

There is a specific lack of research into the impact of ERP in developing countries and in particular China. China has a unique economic context and culture (Weber 1951; Nevis 1983; Boisot and Child 1988; Boisot and Child 1996; Boisot 1996; Boisot and Child 1999; Martin and Larsen 1999; Jeong 2003; Martinsons 2004) and although in recent years there has been significant growth of the Chinese economy and also integration with the world economy, China is still a developing country with particular problems and challenges. Many of the previous studies into the impact of ERP on organizational structure can be criticized because they lack a specific focus
upon a clearly defined organizational context, and therefore it can be difficult to
determine the extent to which variations in the impacts might be associated with
differences in the company's size, operational sector or cultural context. Consequently, this research has excluded SME's (Small and Medium Enterprise) and focused upon companies that have more than 300 employees and that are operating in a single homogenous sector, within just one country. It was decided to target large, manufacturing organizations operating in China, as such companies are currently important to the world economy and have not been the subject of much previous scrutiny.

1.2 The Contribution of This Study

Whilst undertaking the literature survey, several gaps were identified. This research has been designed to explicitly address the main gaps in the academic literature, as outlined below.

1.2.1 The Limited Model of ERP's Structural Impacts

Most past research studies have focused heavily on just one structural dimension, namely centralization. Focusing on only one dimension makes it difficult to find or explain any linkages across different dimensions such as the relationship between centralization and standardization (Child 1977). Furthermore, whilst there have been a large number of studies exploring ERP implementation, few have explicitly explored the structural impact of ERP (Klaus et al. 2000). Since organizational structure plays an important role for organizational control and communication (Galbraith 1977; Fincham and Rhodes 1999), it is essential to investigate the impact of ERP on organizational structure, in order to gain a better understanding of the implications of ERP adoption. In view of this, it was decided to investigate the impact of ERP on a number of different structural dimensions, these are set out fully in Chapter 3.

1.2.2. The Limited Focus of Previous Studies

Another shortcoming associated with past studies of the organizational impact of IT is that they failed to explore the potentially critical role played by organizational strategy. Miller and Friesen (1982a) argued that the inclusion of more factors in research studies can help us to generate more satisfactory empirical findings. As far as this study is concerned, the inclusion of organizational strategy was considered
essential, as it was envisaged that organizational strategy might influence both the uptake of ERP and the design of the organizational structure. A further critical concept that has been omitted from previous studies of the organizational impacts of IT, is organizational flexibility, which it can be argued is facilitated both through the design of organizational structures and the implementation of information technologies (McLoughlin 1999).

1.2.3 Lack of Studies of ERP in China

As has already been discussed above, there has been a lack of research into the impact of ERP in China. China has been regarded as the ERP market with the highest future potential (Industry week, 1997; Allnoch 1997). As yet this prediction has not been realized and some authors have suggested this might be due to difficulties associated with implementing IT (Huang et al. 2002). As a result, it was decided that an investigation into ERP adoption in manufacturing companies in China may prove insightful as to why ERP has not been as widely taken up as expected.

1.2.4. Overemphasis on the Physical Arrangement of IT

Past research has overemphasized the importance of the physical arrangement of technology within a company. For example, in Pfeffer and Lebibici (1977), they measured IT via IT costs, whilst Whisler (1970) and Zeffane (1989) used the number of terminals had been installed in their targeted companies. The shortcoming of such approaches to the measurement of IT lies in the underlying assumption that IT itself, rather than the successful application of IT hardware, can lead to an impact on organizational structure and to success. Grint and Woolgar (1997) have emphasized the complexity surrounding different interpretations of technology: different perspectives on IT can potentially lead to different degrees of usefulness and benefits gained from technology (Woolgar 1988; Orlikowski 1992; McLoughlin 1999). In this study, a broader concept of measuring the impact of IT was employed in that the success of ERP adoption was investigated, in addition to the scale of the implementation, and this focus on benefits has revealed some very interesting results which are discussed in Chapter 8.

1.2.5 Limitations of Research Methods adopted in Past Studies

Finally, the contributions of previous studies have been rather reduced because of
Chapter 1—Introduction

the narrowness of the research approaches employed. As Pinsonneault and Kraemer (1993) note, one problem associated with the research in this area is that most studies adopt a single method and so offer limited results. However, Tashakkori and Teddlie (1998) have argued that as qualitative and quantitative research methods offer distinctly different, yet complementary perspectives, the combining of the two into a mixed methodology can better cope with the complexity of social research. Mingers (2003) provided strong supports for this view when he argued for the application of mixed methodology in order to deliver higher value insights, through the delivery of a richer variety of research outputs.

1.2.6 Summary of Contributions

This study offers three main contributions to the research in the area of IT in organizations. Firstly, this study has focused on a broad view of the dimensions of organizational structure in order to investigate the structural impact of ERP in a more holistic manner. In order to gain insight into the reasons for the high failure rates of ERP implementation projects, and to promote the better integration of ERP within its organizational context, a more comprehensive understanding of how ERP influences structural dimensions is required. Secondly, this research has also investigated the relationship between organizational strategy and ERP implementation to provide an overall understanding of how ERP and organizational structural dimensions are directed through strategy, in order to realize different degrees of flexibility. Thirdly, this research has employed ERP benefits, in addition to the physical scale of ERP implementation, as measures of ERP adoption, in order to investigate the organizational impact of ERP in a more complete manner than has been previously adopted. Through adopting a mixed methodology and through addressing some important gaps in the literature, this study has contributed to an increased understanding of the impact of ERP in Chinese manufacturing companies.

1.3 Research Aim and Objectives

The main aim of this study has been to understand the structural impact of ERP. However, in order to effectively manage this study, the main aim was broken down into five distinct objectives, which are detailed below.

1. This study sought to explore the association between organizational strategy and organizational structure and thus provides important new insights,
Chapter 1—Introduction

based upon empirical data, collected from China. The framework of Miles and Snow (1978) was employed as the theoretical underpinning for this aspect of the study and this is discussed in Chapter 3.

2. Secondly, this study was designed to provide empirical insights into, the possible linkage between organizational strategy and the deployment of ERP, in terms of its adoption, its physical scale and its ultimate success.

3. A further important aim of this study was to explore the structural influence of ERP implementation. It systematically examined how ERP adoption influenced different structural dimensions, in particular: organizational configuration, the degree of centralization, the level of standardization and horizontal integration.

4. Fourthly, this study explored the influences of organizational structure on the degree of flexibility enjoyed by organizations. While it was hypothesized that corporate strategy has inherent implications for the arrangement of organizational structure and ERP deployment, it was decided that it was also desirable to investigate how the structural arrangement, prescribed by organizational strategy, will ultimately influence flexibility.

5. Finally, due to the lack of the empirical investigation into how ERP will influence flexibility, this study sought to investigate the impact of ERP deployment upon organizational flexibility, as it was envisaged that technology, as well as structure, might impact an organization's flexibility.

To explicitly investigate these objectives, the research method, as described in the following section, was deployed.

1.4 Research Methodology and Process

Without a sound methodology, any study's findings and outputs would be greatly devalued. This section aims to provide a brief introduction to the research methodology and research design of this study, as discussed in full in Chapter 4.

1.4.1 Research Methodology

The initial stages of this study involved an extensive literature review, and it soon become apparent that previous studies had been limited in their scope. This was
partly due to the fact that most past studies had adopted only a single research method and this seemed to limit the potential for gaining a comprehensive understanding of the organizational impact of IT. More recently, the studies of ERP system seemed to employ only qualitative methods and the potential usefulness of quantitative studies had been ignored.

In the long history of social research, positivists and interpretivists seem to argue that different research methods are incompatible (Tashakkori and Teddlie 1998). However, the practical merits of the different research methods call for a mixed methodology, especially for studies in the IS area (Mingers 2001, Jick 1979). Both quantitative and qualitative research methods have their own distinct merits and weaknesses, which suggests that the use of a single research method is unlikely to deliver a rich and comprehensive view of the research topic, under investigation. While a quantitative method can effectively collect data from a large sample, a qualitative approach can offer richer insights into the 'social meaning' of the research context (Taylor and Bogdan 1988).

To address these issues a decision was made to adopt a mixed method approach. Consequently, the conduct of this research was divided into two distinct stages. The first stage was undertaken using a questionnaire survey, with the purpose of collecting a substantial data-set, in order to identify any significant associations between different variables. Following the quantitative work, a qualitative study was undertaken in order to generate the 'social meaning' of the research domain [See Chapter 4 and Chapter 7].

1.4.2 Research Process

Having presented the research methodology, it is important to briefly describe the whole process of this study. As illustrated in Figure 1.1, this study started from the extensive literature review, which aimed to identify research gaps. Next, a research model [See Figure 3.1 in Chapter 3] was built to guide the research. In order to better manage this study, the research hypotheses were created by de-composing the research model into distinct elements. The research hypotheses then guided the quantitative and qualitative data collection and the data analyses. Finally, based on the data analyses, the research findings and contributions were written up.
1.5 Structure of Thesis

In order to present this study, this thesis has been structured into eight chapters. Chapter 1 has offered an introduction to the thesis and is followed by the literature review in Chapter 2. In order to better organize the large amount of material, this chapter is structured into different sections, starting with a general overview of the relevant literature and then covering the roles played by IT in organizations; an overview of past studies of IT in organizations; the development of ERP; the impact of ERP, including the benefits of ERP adoption, the risks and critical issues relating to the ERP adoption, and the flexibility resulting from the ERP adoption. Next, since this study has been undertaken in China, the research context and studies of ERP in China have also been presented. The theoretical basis of the research including a discussion of the various organizational structural dimensions and an overview of the strategy typology of Miles and Snow (1978) are set out, as are the concepts of organizational flexibility. This chapter ends with a summary of the research gaps left by previous studies and an overview of the chapter.

Chapter 3 sets out the research framework adopted in study, detailing the research aim and objectives; the research hypothesis and the research model. Chapter 4 presents, in detail, the research methodology and justification for the adoption of a mixed methodology. The detailed design of the quantitative survey is also presented.
Chapter 1—Introduction

and the role of the qualitative study [Fully described in Chapter 7] is set out.

Chapter 5 describes the quantitative data derived from survey, including a description of issues of validity and reliability and the factor analysis and cluster analysis undertaken. Chapter 6 is one of the most important chapters of this thesis and describes the substantive tests of the hypotheses. The hypothesized relationships between strategy and structure; strategy and ERP and ERP and structure are all investigated. In addition, the impact of ERP on the degree of flexibility enjoyed by the organizations is also explored.

Chapter 7 describes the qualitative study, how it was undertaken and the main outcomes. The qualitative data provides important contextual and background information to the study and outcomes relating to the structural impact of ERP, the influence of ERP on organizational flexibility and the importance of focusing on ERP benefits are discussed.

Chapter 8 sets out the unique contribution of this research and also the potential for future studies and personal reflections have been presented. The fast evolution of IT systems continues to pose new challenges to researchers in the field. It is increasingly important to understand the impact of IT on organizational structure in order to develop new strategies and new approaches to organizational management in an increasingly dynamic economic climate. This study offers a comprehensive and convincing understanding of the structural impact of ERP. Therefore, in this chapter, after briefly reviewing the study's findings, a critical appraisal is presented of its contributions.
Chapter 2

Literature Review
2.1 Introduction

Organizational research has not been considered an independent field of academic study for as long as other social sciences, such as Psychology or Sociology. Its intensive study started after the Second World War. Despite its short history, the scope of organizational studies has extended quickly so that it now includes organizational design, organizational culture, and organizational politics. It has borrowed heavily from other sociological disciplines. For example, organizational cultural studies owe much to anthropological studies (Smircich 1983).

Organizational research is a branch of social science where researchers study groups of people, rather than a single individual or the whole of society. Many authors have argued that organizational research can not be regarded as an 'exact science' (Becker 1940; Alexander 1946) due to the complex nature of the subject (Emory 1976; Bhaskar 1979; Hollis 1994; Berg 1998; Mingers 2004b). The multifaceted nature of organizational research and the complexity of social science make it impossible to explore how ERP will influence every aspect of organizational life through just one project. Indeed, most studies exploring the relationship between IT and organization have focused on just one element of this complex area.

This chapter first reviews the literature on the role of IT in organizations and the relationship between IT and organizational structure. The history of the development of ERP software is briefly described and the main challenges associated with implementing enterprise systems are discussed, as are the potential benefits and competitive advantages for business. This study has been undertaken in China and some of the special characteristics of the Chinese approach to ERP implementation are described and analyzed. Much research on ERP has already been undertaken but there are some important gaps in the literature and these gaps are set out. It is argued that most of the currently published studies overemphasize the physical arrangement of IT in organizations and fewer still have investigated the impact of ERP on organizational structure. Those researchers that have investigated the relationship between ERP implementation and organizational structure have only included one or two of the important relationships in their investigation. It is suggested that more factors need to be investigated if an understanding of the relationship between ERP and organizational structure is to be developed within the field. It is also argued that one
of the reasons for the narrow view of the impact of ERP implementation on organizational structure in the literature is the methodological monotony of the research studies within the field.

2.2 The Role of IT in Organizations

2.2.1 Overview of the Literature

IT plays a critical role in organizational life. IT is not only used for the coordination of diverse activities (Bariff and Lusk 1978; Argyres 1999), and the collection and processing of information for decision makers (Bariff and Lusk 1978; Sampler 1996), IT is also used to facilitate the design and redesign of workflows and jobs and also for restructuring the organization (Bariff and Lusk 1978; Harrington 1991; Robey et al. 1995). With the rapid development of IT applications for organizational control and management (Tapscott 1996), the importance of IT has been widely recognized by practitioners and academic researchers. For example, ERP software has been specifically designed to provide support for internal functions as well as to facilitate external relationship management (Chen 2001; Ettlie et al. 2005). Keller and Tueful (1998) suggest that ERP software offers unprecedented advantages that facilitate both effective organizational control and contribute to the attainment of business objectives.

The emergence of IT has offered managers new possibilities for organizational information processing (Markus 1984; Dibrell and Miller 2002; Crowston and Myers 2004). Klatzky (1970) suggested that IT would lead to a 'cascade effect', where higher level managers released part of their responsibility to lower level staff. Pfeffer and Lebcibici (1977) and others (Wijnhoven and Wassenaar 1990; Dewett and Jones 2001) suggested that IT could be used to monitor staff more effectively, and that more responsibility would be assumed by lower level managers because effective feedback could help organizations to manage by exceptions. One of the ways that IT facilitates the achievement of business advantages is to support the redesign of organizational structure.

Structure is the organizational arrangement that supports the pursuance of an organization's objectives (Burns 1963; Galbraith 1994). A structural arrangement might be embodied by the patterns of relationship, hierarchal or lateral, communication and authority (Thompson 1967; Fredrickson 1986). Burns (1963)
regarded organizational structure as a special kind of technology, an instrument, serving organizational objectives. Organizational structure has been widely studied by many authors (March and Simon 1958; Pfeffer 1978; Pfeffer 1982; Klein 2001; Wang 2001; Dibrell and Miller 2002; Sauer and Willcocks 2003). The prescribed relationships, hierarchy and authority, embedded in an organizational structure, can form the basis for organizational information flow and communication (March and Simon 1958; Bartlett and Ghoshal 1997). As an important means for information transmission, organizational rules are not just negative (Fincham and Rhodes 1999), they benefit organizations by condensing large amounts of information into prescribed regulations (Cyert and March 1992). Under the specification of rules, routines make it possible to coordinate many simultaneous activities in a way that makes them mutually consistent. Routines help avoid conflicts. They provide codes of meaning that facilitate interpretation of ambiguous worlds (March 1989). Therefore structure acts as a mechanism for channelling information flow and communication between members (Galbraith 1977; Bartlett and Ghoshal 1997). In addition, structure can also prescribe the control mechanism and systems for achieving organizational objectives (Child 1969; 1973a; 1984). As a conceptual instrument designed to serve organizational objectives, structural design however must take into account the limited human capabilities in dealing with information. Organizational designers have to understand the capacity of this channel for transmitting information and the capability of the decision maker to process information (Dibrell and Miller 2002).

Simon (1977) argued that IT will change the structural arrangement in organizations, even when IT has been used mainly for automation purposes. The information provision, automation and communication functionalities provided by IT are closely linked with organizational daily management. In addition, the influence of IT on the information ownership and allocation, one source of organizational power (Clegg 1947; Cyert and March 1992), has the potential to change organizational structure (Zuboff 1988). Organizational structure and IT both have a role in providing information for management purposes; there is an inherent relationship between them. Galbraith (1977) and others (Wang 2001; Dibrell and Miller 2002) argued that IT has the potential to increase the information processing and transmission capability of the structure, and so when designing organizational structures, this should be taken into account. As a consequence, the relationship between IT and structure has a great influence on the achievement of organizational goals.
Chapter 2—Literature Review

Ever since IT has been introduced into organizations, there have been arguments with regards to the nature of the influence of IT on organizational practice and on its relationship with organizational structure. Starting from Whisler (1970), the relationship between IT and structure has attracted a significant amount of attention from academic researchers. There have been a number of frameworks developed [See Table 2.1 for an overview]. For example, Spanos et al (2002) suggested that the adoption of ICT would lead to a more decentralized and lean organizational structure. Scheepers and Damsgaard (1997) argued that the adoption of intranet would commonly go through two stages. In the first stage, the intranet is more shaped by organizational structure, but the intranet will be more pervasive after being institutionalized, and will in turn shape organizational structure.

In the past, in a stable environment, a bureaucratic approach to organizational design would have been adequate and managers were able to concentrate most of their attention on the internal arrangement; production efficiency was of prime importance (Fincham and Rhodes 1999). But when facing a volatile environment, organizations have to adapt. Efficiency and formal rationality are not as important as a flexible organization design (Fincham and Rhodes 1999).

Reviewing the literature on the impact of IT on organizational structure it is clear that authors have focused on one or two structural dimensions [See Table 2.1]. In addition, the number of quantitative studies in this area is sparse; only (Klatzky 1970; Pfeffer and Salancik 1977; Zeffane 1989; Hitt and Brynjolfsson 1997) have undertaken significant quantitative studies and Hitt and Brynjolfsson (1997) used second hand data collected by other IS researchers. Such research is designed to 'judge a judgment' (Bourdieu et al. 1991) and so the validity of Hitt and Brynjolfsson's (1997) study can be questioned. The lack of quantitative studies is regrettable since such research can offer valuable insight in finding the recurrence and regularities of social phenomena (Weber 1947; Popper 1972a; Giddens 1976; Giddens 1993; Bhaskar 1979).

Other authors have tried to address the topic from a variety of angles [See Robey 1977; Robey 1981; Orlikowski and Robey 1991; Orlikowski 1992]. Most of these studies have employed qualitative approaches to interpret the use of IT in organizations. Robey (1977) reviewed a number of past studies and consequentially suggested that the adoption of IT often leads to no change. Even if there are some changes, he argued, the change should follow a strategy that is directed to cope
Chapter 2—Literature Review

with the environment (Robey 1977). A rather different approach was adopted by Laing (1980), who developed a mathematical model building approach to examine the organizational impact of IT and he concluded that IT should bring about a decentralized structure.

Most of the studies in this field though have failed to systematically check how IT influences the different dimensions of organizational structure. For example in the studies of Robey (1977), Pinsonneault and Kraemer (1993; 1997), Argyres (1999), and Spanos et al (2002), the authors have all focused on centralization and formalization. Issues such as hierarchical level, span of control and lateral relationships have tended to be ignored. This concentration on one or a few measures of structure makes it difficult to identify if there is an interlinked relationship between organizational structure and IT (Robey 1981). Miller and Friesen (1982a) have argued that the inclusion of more factors could help us get more satisfactory empirical findings. So despite the amount of research in this field, there has been no consensus on this topic even after more than forty years' of discussion.
Table 2.1: Past Studies of the Impact of ICT on Structure

<table>
<thead>
<tr>
<th>Reference</th>
<th>Technology</th>
<th>Mediating</th>
<th>Context</th>
<th>Dimensions of Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyres, 1999</td>
<td>ICT</td>
<td>None</td>
<td>Aero-technical design</td>
<td>centralization</td>
</tr>
<tr>
<td>Dewett and Jones, 2001</td>
<td>ICT</td>
<td>None</td>
<td>None (Review of other studies)</td>
<td>size, formalization, specialization, centralization</td>
</tr>
<tr>
<td>Travica, 1995</td>
<td>ICT, size, strategy</td>
<td></td>
<td>Accounting Industry</td>
<td>span of control, formalization, centralization, hierarchy</td>
</tr>
<tr>
<td>Hedberg, et al, 1975</td>
<td>IT</td>
<td>None</td>
<td>None (Argument)</td>
<td>IS control and Power</td>
</tr>
<tr>
<td>Zeffane, R., 1989</td>
<td>IT</td>
<td>Size</td>
<td>Multi-Industry</td>
<td>Formalization, centralization, departmentalization</td>
</tr>
<tr>
<td>Pfeffer and Leblebici, 1977</td>
<td>IT</td>
<td>Size</td>
<td>10 small Manufacturing</td>
<td>Centralization, formalization, departmentalization, hierarchy</td>
</tr>
<tr>
<td>Storey, 1985</td>
<td>Computer Terminals</td>
<td>None</td>
<td>Insurance companies</td>
<td>size, centralization and standardization</td>
</tr>
<tr>
<td>Lal, 1991</td>
<td>IT</td>
<td>Size</td>
<td>Listed New Zealand companies</td>
<td>structuring of activity, centralization</td>
</tr>
<tr>
<td>Foster, 1984</td>
<td>MIS</td>
<td>None</td>
<td>General motor</td>
<td>horizontal and lateral relationship</td>
</tr>
<tr>
<td>Whisler, 1970</td>
<td>Computer Terminals</td>
<td>None</td>
<td>Life Insurance company</td>
<td>centralization</td>
</tr>
<tr>
<td>Burlingame, 1961</td>
<td>IT</td>
<td>None</td>
<td>None (Argument)</td>
<td>lateral relationship, centralization</td>
</tr>
<tr>
<td>Boddy and Buchanan, 1986</td>
<td>IT</td>
<td>None</td>
<td>None (Review of other studies)</td>
<td>lateral relationship, centralization</td>
</tr>
<tr>
<td>Wijnhoven and Wassenaar, 1990</td>
<td>Markus typology</td>
<td>None</td>
<td>Bank, computer companies and etc</td>
<td>formalization, power, routinization, centralization</td>
</tr>
<tr>
<td>Spanos, et al, 2002</td>
<td>ICT</td>
<td>Strategy</td>
<td>500 Leading companies of Greece;</td>
<td>centralization, formalization</td>
</tr>
<tr>
<td>Scheepers and Damsgaard, 1997</td>
<td>Intranet</td>
<td>None</td>
<td>Diverse background</td>
<td>structuration theory in the practice</td>
</tr>
<tr>
<td>Robey, 1981</td>
<td>DSS</td>
<td>Strategy</td>
<td>Eight samples chosen</td>
<td>centralization , lateral relationship</td>
</tr>
<tr>
<td>Pinsonneault and Kraemer, 1993</td>
<td>Automation &amp; IT</td>
<td>None</td>
<td>15 interviews in one Energy Inc.</td>
<td>centralization</td>
</tr>
<tr>
<td>Robey, 1977</td>
<td>IT</td>
<td>Environment</td>
<td>None (Review of other studies)</td>
<td>centralization</td>
</tr>
<tr>
<td>Dawson and McLoughlin, 1986</td>
<td>IT</td>
<td>None</td>
<td>Rail way system in U.K.</td>
<td>centralization</td>
</tr>
<tr>
<td>Laing, 1980</td>
<td>IT</td>
<td>None</td>
<td>None (Argument)</td>
<td>centralization and Hierarchy</td>
</tr>
<tr>
<td>Klatzky, 1970</td>
<td>Computer Terminals</td>
<td>None</td>
<td>50 employment agencies</td>
<td>centralization</td>
</tr>
<tr>
<td>Huber, 1990</td>
<td>ICT and DSS</td>
<td>None</td>
<td>None (Argument)</td>
<td>centralization</td>
</tr>
<tr>
<td>Hoos, 1960</td>
<td>Automation Tech.</td>
<td>None</td>
<td>20 companies</td>
<td>centralization, organization size</td>
</tr>
<tr>
<td>Hitt and Brynjolfsson, 1997</td>
<td>IT</td>
<td>Motivation</td>
<td>Multi-industry study</td>
<td>Centralization</td>
</tr>
<tr>
<td>Dibrell and Miller, 2002</td>
<td>IT</td>
<td>Environment</td>
<td>None (Review of other studies)</td>
<td>IT and organization design</td>
</tr>
</tbody>
</table>
Table 2.1: Past Studies of the Impact of ICT on Structure (Continued)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyres, 1999</td>
<td>Case study</td>
<td>Negative relationship with the decisions making with respects to technical design</td>
</tr>
<tr>
<td>Dewitt and Jones, 2001</td>
<td>Review</td>
<td>Negative relationship with specialization and organizational size; positive relationship with formalization</td>
</tr>
<tr>
<td>Travica, B., 1995</td>
<td>Interviews</td>
<td>Negative relationship between ICT and centralization and formalization.</td>
</tr>
<tr>
<td>Hedberg, et al, 1975</td>
<td>Argument</td>
<td>Positive relationship between IS control and power</td>
</tr>
<tr>
<td>Zeffane, R., 1989</td>
<td>Survey</td>
<td>Positive relationship between PCs and decentralized formalized and departmentalized</td>
</tr>
<tr>
<td>Pfeffer and Leblebici, 1977</td>
<td>Survey</td>
<td>Positive relationship between IT and level of hierarchy, departmentalization, decentralization. Negative relationship with formalization</td>
</tr>
<tr>
<td>Storey, 1985</td>
<td>Case studies</td>
<td>Positive relationship with centralization and standardization</td>
</tr>
<tr>
<td>Foster, 1984</td>
<td>Case studies</td>
<td>Positive relationship with lateral relationship</td>
</tr>
<tr>
<td>Whisler, 1970</td>
<td>Interviews</td>
<td>Negative relationship with size and layers of middle management; Positive relationship with centralization</td>
</tr>
<tr>
<td>Burlingame, 1961</td>
<td>Argument</td>
<td>Negative relationship with centralization</td>
</tr>
<tr>
<td>Boddy and Buchanan, 1986</td>
<td>Review</td>
<td>More integrated functional department, reduced middle management and change of the direction of decision making</td>
</tr>
<tr>
<td>Wijnhoven and Wassenaar, 1990</td>
<td>Case Studies</td>
<td>Positive relationship with span of control</td>
</tr>
<tr>
<td>Spanos, et al, 2002</td>
<td>Survey/interview</td>
<td>Negative relationship with hierarchy levels, formalization and centralization</td>
</tr>
<tr>
<td>Scheepers and Damsgaard 1997</td>
<td>Case studies</td>
<td>Intranet was more shaped by structure during implementation stage and after institutionalization, Intranet could be much more pervasive</td>
</tr>
<tr>
<td>Robey, 1981</td>
<td>Cases studies</td>
<td>IT does not have impact on organization structure</td>
</tr>
<tr>
<td>Pinsoneault and Kraemer, 1993</td>
<td>Case Studies</td>
<td>The impact of IT upon the power of middle management, is contingent upon the degree of centralization.</td>
</tr>
<tr>
<td>Robey, 1977</td>
<td>Review</td>
<td>Centralization or decentralization depends on environment.</td>
</tr>
<tr>
<td>Dawson and McLoughlin, 1986</td>
<td>Case studies</td>
<td>Positive relationship between IT and centralization</td>
</tr>
<tr>
<td>Laing, 1980</td>
<td>Simulation</td>
<td>Decrease of the hierarchy and decentralization of the decision making.</td>
</tr>
<tr>
<td>Klatsky, 1970</td>
<td>Survey</td>
<td>Negative relationship between IT and decentralization</td>
</tr>
<tr>
<td>Huber, 1990</td>
<td>Proposition</td>
<td>In decentralized organization, then more decentralized and in centralized organization, more centralized</td>
</tr>
<tr>
<td>Hoos, 1960</td>
<td>Interviews</td>
<td>Centralization of the control, decrease of the organization size</td>
</tr>
<tr>
<td>Hitt and Brynjolfsson, 1997</td>
<td>Survey</td>
<td>Negative relationship between IT and centralization</td>
</tr>
<tr>
<td>Dibrell and Miller 2002</td>
<td>Review</td>
<td>Structure should be redesigned, by virtue of new information technology, to fit environment.</td>
</tr>
</tbody>
</table>
2.2.2 Challenges in Investigating the Role of IT in Organizations

As an area with a fast changing nature, IS *per se* is a problem for researchers. With IT decreasing in cost and increasing in capability, IT impacts upon every aspect of organizational life (Earl 1987; Tapscott 1996). From the early Data Processing (DP) era during which IT functioned as an automation and information storage tool (Barnatt 1996; Mukherji 2002); through the MIS era (Barnatt 1996; Mukherji 2002), where IT functioned as a decision support system; up to the present day where technology offers highly developed communication support and information transferring tools; each era has had different implications for the organizational context (Swanson 1987). Nowadays, IT has even more potential to ultimately facilitate new forms of organizational design.

Against this backdrop, a key challenge for the researcher, when investigating the role of IT in organizations, is how to model the IT and then its impact. Many past studies (Hoos 1960; Klatzky 1970; Storey 1987; Scheepers and Damsgaard 1997) have merely selected one or several kinds of technology to represent the whole IT concept. Others (Whisler 1970; Zeffane 1989) have employed the number of computer terminals as a measurement of IT. This is obviously inappropriate for today's IT study due to the fast development of hardware and software which makes IT more versatile and powerful in today's business. Pfeffer and Leblibici (1978) attempted to measure IT through IS usage such as the approximate monthly cost of the computer, the number of employees working directly with the computer or in the computer department. By contrast, Wijnhoven and Wassenaar (1989), borrowing from Markus (1984), categorized IT into different groups. All of these approaches however fail to adequately account for the diverse support modern enterprise systems offer organizations today.

In addition to the above challenges, research design can create other barriers to the understanding of IT in organizations. Whisler's study (1970) failed to control for the size of organizations. Similarly a large number of past studies did not fully take into account the environmental influences (Whisler 1970; Zeffane 1989; Wijnhoven and Wassenaar 1990; Spanos et al. 2002). Without controlling for contextual factors, survey studies can suffer from a lack of rigor. For example, see Zeffane (1989); Hitt and Brynjolfsson (1997); Spanos et al. (2002). The studies of Spanos et al (2002) and Zeffance (1989) both illustrate a further problem in that each included data collected from different industries with very different and distinctive natures; this
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makes it difficult to control the moderating variables. Although Spanos et al (2002) attempted to link strategy and structure, they did not find any strong relationship between the two. They argued that the lack of any significant association might be due to the reason that Greek management practice lagged behind other developed countries.

Compared with other researchers, Pfeffer and Leblebici (1997) offered an exemplary empirical study with rigorous design. Methodologically, they first deducted the hypotheses from past built theories. These deducted hypotheses are subsequently tested by a strictly controlled survey research method. During the sampling stage, they also strictly controlled the context of samples. The samples were only selected from the manufacturing industry. This study illustrates the importance of ensuring the research is designed rigorously and with care and attention. The lack of rigorous research design in other studies may partly explain the conflicting findings between the different studies. The next section examines the history of enterprise systems and describes the development of ERP. This discussion is needed to set out the context for this research.

2.3 MRP: The Beginning of Enterprise Software

MRP (Manufacturing Resources Planning) systems have played a significant role in the development of ERP and have influenced the scope of ERP software. MRP were developed to support production in manufacturing organizations and led to the idea of enterprise wide software.

MRP was developed to cope with the ever changing business environment (Higgins et al. 1996). According to Higgins et al (1996), today's competitive business environment urgently demands more sophisticated IT that can empower manufacturers meeting the customers' specifications more effectively. There are two roles fulfilled by MRP, namely planning and control, but it is mainly used to support material requirements planning. However, with MRP there was a limited integration between technology and user (Chung and Snyder 2000) and this constrained the usefulness of this type of software and led to the development of MRP II in the 1980s.

Compared with MRP, MRP II is a much more sophisticated system. MRP II is based on backward scheduling logic (Chung and Snyder 2000). This system does not limit
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itself to material planning and control; rather it is regarded as a system for manufacturing planning and scheduling. Specifically it contributes to production operations through supporting the identification of customer requirements. At the strategic level, MRP II supports matching products with the customer requirements. At the tactical level, however, it is focused on dividing production scheduling into manageable tasks. With this integration effort MRP II links the long-term and short-term planning of production and includes a large number of components such as Strategic Planning, Demand Management and Sales and Operation Planning (Sheikh 2003).

In sum, MRP II is a system dedicated to manufacturing planning and control. It integrates long-term and short-term planning and control activity by different components. MRP II thought is still based on the idea of an organization structured into separate functional departments. The data is all isolated in silos; and data is retrieved and stored where it is needed, without fully integrating the technology with task. Chung and Synder (2000) point out that an MRP system is inward looking, and the main achievement for the organization is increased efficiency. This focus on efficiency is preferred when the organizational environment is stable. However, in order to effectively deal with a volatile environment, a system with a more outward focus is needed (Cullen et al. 2001), which ultimately motivated the development of ERP.

2.4 The Development of ERP

2.4.1. The History of ERP Software

Sheikh (2003) defined ERP as ‘an accounting-oriented IS for identifying and planning the enterprise-wide resources needs to take, make ship, and account for customers orders’ . In contrast with MRP and MRP II, ERP is designed to cover more business functional areas with the purpose of linking the organization together. This wide coverage enables organizations to integrate different departments and respond effectively to external changes. ERP is, firstly, software with different modules for different functions within organizations. As an integrated system, it is built on client/server¹ architecture. Davenport (2000b), however, suggested that this

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¹ Client/server model: an architecture in which an electronic ERP application is divided into one part used by an individual user (client, front end), which run on the user end system, and another part used by all user (server, back end). The idea is to achieve the most optimal usage of the resource involved. Integrating the advantage of multi-user host computer with the client/server model allows the individual function of an application to be carried out by the system that is best suited for the task (Keller & Teufel 1998)
client/server architecture inherits much from past mainstream technology whereas others have emphasized the difference between them (Tarn et al. 2002).

At the same time, the idea of support for best business practices is often associated with ERP. The implications of ‘best business practices’ are promotion of standardized processes, organizational discipline, and cross-functionality (Miranda 1999). ERP implementations ‘force’ organizations to streamline and standardize their processes across the organization and within individual business units (Nah et al. 2004). ‘Best business practices’ can also be defined as the most efficient (least amount of effort) and effective (best results) way of accomplishing a task, based on repeatable procedures that have proven themselves over time for large numbers of people. Such ‘best business practices’ have been used to guide the design of ERP software modules and in addition, ERP software is also designed to be ‘industry specific’, i.e. the software has been designed to support the practices within a specific industry. This is why implementing an ERP system has the potential for changing the organizational structure of a business enterprise.

Since ERP is designed to be an integrated system, it demands a highly standardized environment (Davenport 2000b). To identify areas of commonality is therefore the key task for ERP implementation because only after this is completed can organizations begin to design uniform practices and procedures. ERP software is underpinned by a process-oriented philosophy which emphasizes interconnected activities, through which organizational processes can be aligned and improved (Callaway 1999; Light et al. 2001; Kallinikos 2004a). Some of the core ERP modules include Accounting; Financial Management; Manufacturing; Production; Transportation; Sales and Distribution; Human Resources; Supply Chain Management; Customer Relationship Management and e-business (Kumar and Van Hillegersberg 2000; Al-Mashari et al. 2002).

ERP also employs a graphical user interface, fourth generation computer language programming and a client/server architecture (Sheikh, 2003). By virtue of these technical advantages, an ERP system offers organizations a more flexible user/technology interface. The two or three-tier Unix-based client/server architecture (Tarn et al. 2002; Yen et al. 2002) makes it possible for enterprise-wide data access. Users can easily interchange and access an enterprise-wide database. ERP systems integrate all the functions of an organization and so can remove ‘islands of information’ (Muscatello et al. 2003) and replace legacy systems. Sheikh (2003)
argues that an integrated system helps organizations to collect, collate, and analyze information in a timely and effective manner. ERP can thus facilitate data exchange in order for effective decision-making (Voordijk et al. 2003). The main benefit of ERP is then the contribution to the efficient operation of an enterprise, by reducing inventory costs, decreasing operating costs and streamlining processes (Sheikh 2003). Furthermore, influenced by the Business Process Re-engineering movement [See Fahy 2001; Hall 2002; Voordijk et al. 2003], ERP is designed to be more process oriented in nature and so emphasize the horizontal coordination across organizational functional departments (Davenport 2000b). This process orientation benefits organizations through the increased capability to respond to environmental changes (Davenport 2000b). In addition, the industry specific 'best practices' embedded in ERP software offer a direct potential for the improvement of management capabilities (Kumar and Van Hillegersberg 2000).

Globally, SAP, Baan, Peoplesoft, J. D. Edwards and Oracle are the five key vendors of ERP software (Rashid et al. 2002). SAP, a German company founded in 1972, controls one-third market share itself. These five vendors, however, have their own distinct areas of competence (Davenport 2000b). SAP, for example, is the best seller in large organization and energy industries. Its logistics and manufacturing modules are SAP's core competence. The recent integration of ERP with the Internet has injected new energy into the ERP market. Since ERP has been implemented in many developed countries, the developing world will be next big market for vendors. The forecasted market potential of ERP is still very positive (Poston et al. 2000).

2.4.2. The Benefits of ERP Adoption

Davenport (2000a) suggested that the reasons for the adoption of ERP are often associated with the challenges of globalization, business need and acceleration of product innovation. This view is supported by Umble et al (2003). Callaway (1999) suggests that the implementation of ERP can drive the improvement of business performance. This view is also supported by Oliver and Romm (2002). Kumar and Van Hillegersberg (1986) found that commonly, it is Chief Executive Officer (CEO) rather than Chief Information Officer (CIO) who takes the charge of initiative for ERP adoption, which suggests that businesses understand the strategic potential offered by ERP. Markus and Tanis (1999) concluded that the reasons for organizations adopting ERP could be categorized from a technical perspective and from a
business perspective. Technical reasons for ERP adoption included the need to solve Y2K and similar problems; to integrate applications cross-functionally and to consolidate multiple different systems of the same type. ERP also helped to eliminate redundant data entry and concomitant errors; improve the IT architecture and decrease computer operating costs. The business reasons for adopting ERP included the need to accommodate business growth; provide integrated IT support; standardize business processes, particularly across different locations and to improve company-wide decision support [See Markis and Tanis, 1999, p180].

Sarkis and Sundarraj (2003) undertook a case study of Texas Instruments Corporation and argued that ERP implementation can aid companies to reduce response time and inventory, and improve on the delivery times. In their study they found that the ERP system integrated the business operation across different countries and the company managers benefited from access to real time information and an increased understanding of the consequences of any changes made to part of the company. However, Sarkis and Sundarraj (2003) also reported that there was reduced productivity in the months soon after the adoption of ERP. They suggested that this may be due to the learning curve. Finally, and most importantly, they reported the adoption of ERP provided the company with the opportunity to rationalize their processes and models. Despite the successful case reported by Sarkis and Sundarraj (2003), it must also be acknowledged that there are significant problems with ERP implementation in organizations.

2.4.3 Risks Associated with ERP Implementation

Davenport (2000b) and Kallinikos (2004b) suggest that ERP does not automatically deliver benefits and have pointed out that some totally adverse effects may derive from the installment of ERP. No matter what the motives for adopting ERP, the implementation process demands huge energy, manpower and resources, and significant failure rates in ERP projects have been reported (Voordijk et al. 2003).

Scott and Vessey (2000) advocate a failure-learning model for organizational adoption of ERP. They suggest two kinds of approaches for organizational learning. One approach is to learn from self-experience and the other approach is to learn from other organizations. Both these approaches to learning from failure have their advantages and disadvantages but neither seem adequate to support ERP implementation, which is a complex integration exercise. Robey et al (2002)
suggested that the configuration of the ERP package itself can create difficulties. The software will determine the way that processes are handled in the business and even if the new approach is a significant improvement, staff will need to be trained. Lee and Lee (2000) analyzed the implementation of ERP systems from a knowledge transfer perspective. They suggested that there are two types of knowledge that need to be transferred from the ‘old system’ when implementing a new ERP. First, it is necessary to transfer canonical knowledge, which is expressed explicitly in ERP system. Non-canonical knowledge is more implicit and so is more difficult to transfer. Non-canonical knowledge is related with personal experiences and so is difficult to encode. Lee and Lee (2000) suggest that after the more explicit canonical knowledge is transferred, there should then be an integration stage for non-canonical knowledge where there is a focus on the rules and values implicit in working practices.

Inevitably, ERP system adoption in organizations is related to change management. Organizational change is an ambiguous notion and covers a large scope of academic research [See Kelly and Amburgey 1991; Callaway 1999; Koch 2001; Skok and Legge 2001; Al-Mashari et al. 2002; Hall 2002; Kumar et al. 2002; Carton and Adam 2003; Sarkis and Sundarraj 2003; Umble et al. 2003; Koh et al. 2006]. Quattrone and Hopper (2001) have questioned whether it is appropriate to assume that organizations always have a specific goal, which guides organizational actions during the change process. They pointed out that change, as a social action, is the integration of knowledge, rationality and praxis. Since Quattrone and Hopper (2001) refuted the separation between knowledge and action, found in other research, they prefer to use the term ‘enact’ to represent knowledge and action during change. These arguments seem to be supported by their ERP study project. Change, in their opinion, should not be regarded as a centred process with single-rationality, it is more complex.

2.4.4 Success Factors Associated with ERP Implementation

Among the research on implementation issues, probably the most commonly addressed topic is the identification of those factors that might improve the success of ERP project. Hong and Kim (2002) suggested that the ‘fit’ between ERP and an organization has a significant influence on implementation success; a good ‘fit’ leads to increased success. Sarkis and Sundarraj (2002; 2003) found there are many issues to be addressed in ERP implementation including the strategic vision
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and plan, top management support, user characteristics and change management. Al-Mashari et al (2002) also found that having a strategic vision does contribute to a successful ERP implementation. Muscatello et al (2003) suggested from their case studies that the most vital issue for implementation is management sponsorship. Adam and O'Doherty (2000) found that there are different implementation experiences in different countries. They suggested that to be successful, top management should have a clear and specific managerial objective before implementation begins. Umble et al (2003) find five Critical Success Factors (CSFs) for ERP implementation, whose importance has been confirmed by Sarker and Lee (2003). These CSFs include:

1. Clear understanding of strategic goals;
2. Commitment by top management;
3. Excellent project management;
4. Organizational change management and;
5. A great implementation team.

(Umble et al, 2003, p244-247).

Most authors agree that ERP is a kind of 'shaping technology' with the potential to change organization practices. A list of CSFs might well offer guidance for a short term successful implementation, but the longer term interaction with a wide range of organizational functions is more important for long term success. For example, Tarn et al (2002) argued that an integration of ERP and Supply Chain Management (SCM) could offer organizations both internal and external benefit at the same time. Similarly, Ng and Ip (2003) argued that in order to continuously improve organization performance ERP should be integrated with Internet, by so doing organizations can explore global opportunities.

Some researchers have insisted that IT offers an organization a competitive advantage (Hossain et al. 2002; Roldan et al. 2002; Ng and Ip 2003), whilst others such as Fahy (2001) have disagreed with this idea. Fahy (2001) argue that since IT can be purchased by anyone, it is no longer a competitive tool. Lee and Lee (2000) suggest that the real competitive value of ERP is the process embedded in the ERP software. This social shaping perspective is also supported by Sia et al (2002) in their exploration of post-bureaucratic studies. Similarly, Booth et al (2000) found that the adoption of ERP does not force organizations to manage at all and these authors work reminds us of the limitation of a technological imperative. Therefore, IT
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is just a conditional tool for competitive advantage.

It is important to remember that simple technical superiority does not guarantee a long term competitive advantage. It is the integration between the various organizational elements that cannot be copied by others and that ultimately contributes to the successes of business (Porter 1996). Among those elements, organizational structure is without question of importance due to its role in organizing, managing, controlling, and communicating within organizations and offering opportunities for increased flexibility within the organization.

2.4.5 Supporting Organizational Flexibility with ERP

The design of ERP software, with the incorporation of 'best practices' is a double-edged sword; it can be the impetus for, or a constraint on change depending on the implementation environment. In addition, Schneider (1999) questioned the probability of the claimed process philosophy being fulfilled by the functionally organized ERP modules, though Hong and Kim (2002) suggest that the process philosophy of ERP breaks away from past bureaucratic organizational forms. Teltumbde (2000) has argued that the real question concerning the usefulness of embedded 'best practice' is the potential influence on flexibility. Koch et al (1998) suggest that organizations adjust themselves to software and vice versa, but this seems more difficult with ERP software from a practical perspective because of the high cost and long time period required if customization of the software is undertaken and this approach can create compatibility issues. This issue is especially a problem for small and midsize organizations (Willis and Willis-Brown 2002). Agarwal et al (2000) maintained that there are standard processes written into ERP software and this constrains, the flexibility of an organization. They also suggest that the effectiveness of standardized software will have a limited capacity to support different practices in organizations. Chen (2001) argues that only by adjusting organizational practice to what ERP system advocates, can an organization make full use of this system. What this software delivers is a much more rigid configuration, and this configuration shapes and formalizes organizational practices.

Although vendors have designed industry and size-specific ERP applications with the express purpose of explicitly catering for different customers' requirements, clients may still question whether this deployed infrastructure itself will be a source
restricting organizational flexibility. For example, a case study by Hanseth et al (2001) suggests that the complexity of ERP projects in fact could lead to organizations losing control. In particular, the results from their case studies showed that an ERP system could be a barrier towards a flexible organization. Recent research has placed more attention onto implementation issues (Esteves and Pastor 2001). Unfortunately, very few have explored meaning of ERP in organizations (Hanseth et al. 2001). There are still a large number of failure cases of ERP implementation projects reported (Scott and Vessey 2000). Its high cost, long implementation period, and change of past business practice can endanger the survival of organizations, especially for small and middle sized organizations. Theoretically and technically, ERP is a powerful and unprecedented technology with a high potential to contribute to the success of the businesses. In the following section, studies of ERP practices in China are presented in order to provide a contextual overview and to offer insight into the adoption of ERP in this developing country.

2.5 ERP in China

2.5.1 The Chinese Context

As a communist country, China has a unique political, economic and social environment, when compared with its western counterparts (Boisot and Child 1996). The long history of Confucian indoctrination (Weber 1951) and the resistance against the import of foreign culture further strengthened those characteristics. China inaugurated its economic reform beginning in 1979 (Boisot and Child 1988) and more recently, especially after 1990s there has been a boom of new private companies being established. This, and the inrush of large number of foreign investment are changing traditional Chinese company forms. The withdrawal of Chinese government investment from many areas left space for the development of the Private Ventures (PVs). It is reported that PVs are little by little replacing the State Owned enterprises (SOEs) in some areas (Boisot and Child 1996). At present, the mix of the SOEs, PVs, and other different forms of foreign investment comprise the main Chinese organizational forms. It is more appropriate to regard the Chinese economy as a transitional one, moving towards network capitalism (Boisot and Child 1996; White and Liu 2001).

As far as the macro-economic environment in which organizations conduct their
businesses is concerned, the planned economy is fading out of the Chinese economic area, (Boisot and Child 1988). China, after joining the World Trade Organization (WTO), is now anxiously searching for support from other countries for its market economy status in order to get favourable trading relations. However, in contrast to Boisot and Child's (1996) optimistic stance that suggests a retreat of the government intervention, others suggest that the Chinese government still makes use of its enormous power in intervening in the Chinese economic development. The 'East Asian Executive Report' (2004) especially pointed out the strong intervention from the Chinese government on the management of businesses, which is opposed to what is expected from foreign investors and observers. The report suggests that four major government agencies strictly control the economic development of China. The State Planning Commission, for example, enjoys its special role as the governor of economy by controlling the prices of resources allocation. Its function is however not limited to price control alone. This department also has the power to determine infrastructure development; enterprise, financial and other reforms; foreign investment and foreign trade.

Guanxi, the personal relationship between people, is another matter that is of enormous importance to the Chinese (Chandler 1962; Xin and Pearce 1996; Martin and Larsen 1999). Some even coined this characteristic as 'Guanxiology' (Leung and Wong 2001). Some scholars (Boisot and Child 1999) have argued that one consequence of the lack of an integrated market system in China has been a heavy dependence on personal networks for information exchange. At present, it is still difficult to gauge the degree of influence that Guanxi may have in Chinese organizational contexts.

Micro-economically, Chinese organizations also suffer from the lack of infrastructure and the deficiency of financial resources. The nascent supply chain is always frustrating the foreign investor (Souza 2003). In addition, the large turnover rate of employees also disturbs the organizational management (Winfield 1999). Specific to the ERP adoption, Martinsons (2004) pointed out the deficiency of the available IT hardware in Chinese organizations, SOEs or PVs.

In sum, the Chinese business environments and management practices bring a new context which makes the ERP projects in China different from their Western counterpart, and therefore a particularly interesting area for innovative new studies.
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2.5.2 ERP in China

While ERP systems have already been widely adopted by the companies in developed countries e. g. US and UK, their implementation in developing countries is slow, though recently the adoption of ERP in China has accelerated (Xue et al 2005). SAP, for example, has already made significant inroads into the China market (Kumar and Hillegersberg 2000). This growth has left important gaps for present academic research since most of the top 500 companies globally have a remote manufacturing site in China (Michel 1998).

China and India are both thought of as the future ERP market with huge potential for growth (Industry week, 1997; Allnoch 1997). In general, ERP in China is still in its infancy. This is because the number of companies who have adopted ERP is few when compared with the figure for the developed countries. According to the data from Reimers’ studies (2002; 2003) none of the ERP vendors absolutely dominates the China market. Table 2.2 lists the market share of the different ERP vendors:

Table 2.2: ERP Vendors in China (Reimers 2002)

<table>
<thead>
<tr>
<th>Vendors</th>
<th>Number of China customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cincom</td>
<td>3</td>
</tr>
<tr>
<td>Epicor</td>
<td>20+</td>
</tr>
<tr>
<td>Glovia</td>
<td>29</td>
</tr>
<tr>
<td>IFS</td>
<td>75+</td>
</tr>
<tr>
<td>Intentia</td>
<td>40+</td>
</tr>
<tr>
<td>Lilly Software</td>
<td>55</td>
</tr>
<tr>
<td>MAPICS</td>
<td>175</td>
</tr>
<tr>
<td>Oracle</td>
<td>350 companies</td>
</tr>
<tr>
<td>PeopleSoft</td>
<td>200+</td>
</tr>
<tr>
<td>QAD</td>
<td>450 (all manufacturing)</td>
</tr>
<tr>
<td>Ross Systems</td>
<td>7</td>
</tr>
<tr>
<td>SAP</td>
<td>450</td>
</tr>
<tr>
<td>Scala</td>
<td>300+ sites</td>
</tr>
<tr>
<td>SoftBrands</td>
<td>300+</td>
</tr>
<tr>
<td>SSA Global</td>
<td>400+</td>
</tr>
</tbody>
</table>
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For a long time, the SOEs dominated economic development in China. But nowadays, the private sector is booming (Martinsons 2004). In some provinces, the private sector contribution to the economy has exceeded the state owned companies. The big challenge for this study comes from the Chinese special economic context and cultural background. Davison (2002) argued that awareness of the cultural difference is of critical importance to the success of ERP. Similarly, Martinsons (2004) presented his case studies in China and those findings illustrated the difference between Chinese ERP projects and those of western countries such as UK and America. He (2004) mentioned the paucity of ERP studies in developing countries. Therefore, it is expected that this study will contribute to the empirical data from developing countries, especially from China whose manufacturing industry is booming.

As set out in the previous sections of this chapter, most of the current ERP literature focuses on the issues relating to the implementation of ERP and as a result, the study of the relationship between ERP and organizational structure has been ignored. Furthermore, studies on how ERP influences the organizational structure in Asian developing countries such as China are still very few in number (He 2004). This project aims to reduce this gap and to generate more understanding on how ERP impacts upon organizations in China.

The Chinese economy has changed in recent years, from a centrally planned economy to one that is based more on market forces and so Chinese companies have placed more and more importance on financial issues (Wang et al 2004). Chinese economic and political factors are always mentioned as special features of this market (Reimers 2002; 2003; Martinsons 2004; He 2004) influencing the motive for the adoption of ERP, the degree of top management involvement and the extent to which ERP project is successful. The ownership structure of Chinese companies significantly influences ERP projects as well. In his study of ERP projects in China, Reimer (2002; 2003) classified the ownership into PVs, SOEs and Foreign Owned Enterprises (FOEs). Reimers (2002) reported that while SOEs are more driven by the motive of strengthening management control and of reducing the purchasing cost, private owned Chinese companies commonly directed their ERP project at achieving a better financial performance and prompt reduction of bad debt. By contrast, the foreign controlled companies concentrate their attention more on the adoption of the ‘best practices’ and effective process management. In his recently published article, He (2004) pointed out that SOEs commonly lack the incentives for
the adoption of ERP. This kind of bureaucratic organization with special emphasis on Guanxi (Xin and Pearce 1996) rather than technical knowledge differentiates SOEs from the private companies, who are commonly assumed to pursue profit maximization. While ownership structure directly affects the motives and the process of the adoption of ERP, surprisingly it did not ultimately influence the results of ERP adoption (Reimers 2002).

In addition, another challenge for ERP projects in China is the culturally unique management approach adopted by Chinese companies. Wang et al (2004) have reported that Chinese companies rely heavily on the managerial experience and the intuition of senior personnel, as is in keeping with Chinese culture and their respect for those that are older in any group. Reimers (2002) has argued that many of Chinese companies adopted ERP only for the reason of 'going public'. Similarly, Reimers (2003) and Martisons (2004) reported that Chinese ERP projects commonly led to a reorganization of responsibility which in consequence reduces the cost of the production. Martinsons (2004) argued that this is distinctively different from western companies who emphasize the process philosophy and aimed for a highly flexible management and ultimately high customer satisfaction. The work of Martinsons (2004) also emphasized the importance of understanding the context for studies and the needs for insight into present Chinese ERP projects. As the world factory (MSI 2004), China attracts so much investment by dint of its inexpensive labour cost. Most of the manufacturing businesses in China thus have a prescribed goal to reduce cost, which then predetermine the utility of ERP.

Winfield’s study (1999) of UK manufacturing companies operating in China also shed some light on the special characters of the business in China. He argued while UK manufacturing companies have to transfer their facilities to China in order to eliminate the disadvantage from high labour costs, other problems are incurred by this transference. For example, management philosophies such as Total Quality Management (TQM) could not be sustained in China as first, the Chinese workforce has no training in these approaches (Nevis 1983) and second, there is a high turnover rate of the production force. Since ERP is a system with embedded management philosophy and best practice, it thus raises the questions of how Chinese companies can take such issues into account. As stated by Reimers (2002; 2003), ERP will inevitably induce change in Chinese organizations. But ERP systems embody the concepts and management philosophies from western countries, its adoption into Chinese companies thus could ultimately challenge the
original management practices of organizations located in China.

Another matter significantly influencing the decision making for the adoption of ERP is Chinese organizations' limited financial resource (Wang et al. 2004). The expensive customization cost might force Chinese organizations to adopt the off-the-shelf software, which then creates a problem that Chinese companies have to adapt themselves to the Western 'best practices' (Wang et al. 2004; Zhang et al. 2005). Some companies can only afford to implement a few modules of ERP rather than the whole package. At the same time, the technical complexity of ERP, the lack of IT infrastructure and the lack of IT staff are other common problems affecting decision making for ERP adoption (He 2004). Martinsons (2004) suggested most of the available IT infrastructure for Chinese companies is in their financial and accounting department and when compared with the private companies, SOEs lack a basic level of IT. Therefore, in recent years, while there is a dramatic increase of the number of the ERP adoptions, we also witness a large failure rate of ERP projects in China (Xue et al. 2005).

The in-depth case conducted by Reimers (2004) illustrates the ways that problems can arise when implementing ERP. Reimers (2004) detailed the adoption of SAP R/3 ERP in one company, where during the implementation process, the company continuously lost its key personnel, and so the adopted ERP system could not support the whole operation of the company at all. As to the different functions, only part of the work was automated by the ERP system, and this meant that the company could not reap the benefits of an integrated system at all. The sales manager still had to contact the manufacturing manager in order to check the availability of the stocks. Furthermore, some functions have had to be supported by other IT applications in the purchase department. The reason for this is the lack of the trained people employing ERP for the follow-up. Reimers (2004) identified two main issues that seriously hampered making full use of the ERP system. First of all, the lack of the training for the employee makes it difficult for them to use ERP system. Secondly, the adaptation of ERP to local legal and commercial environment also frustrates the processes of the adoption. Similarly, Souza (2003) reported a case in which ERP has had to be adapted to the local government's specification for producing a financial information report.

The unique features of Chinese economic, political, and cultural environment challenge the application of ERP and its embedded 'best business practice' when
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applied into organizations (Xue et al 2005; Wang et al 2005). China is a developing country lacking resources especially for the adoption of ERP, an expensive system. China's inherent culture and externally posed restriction from the government may also conflict with the ‘best practices' of ERP (Xue et al 2005; Zhang et al 2005). Furthermore, the high turnover rate of the employee, the relatively untrained labour force, the different organizational practices constrained by the political environment and the lack of infrastructure system all pose challenges for the successful implementation of ERP.

Although there have been many studies addressing ERP adoption in developed countries, studies for Asian countries are still few in number (Allnoch 1997). There is a particular lack of studies of ERP adoption and its implication for organizational structure in Chinese organizations. Further, as a developing country, China offers a good opportunity for the study of the impact of IT on organization. Martinsons (2004) suggested that the IT application in Chinese organizations is far behind their counterparts in developed counties. The different degree of the application of IT in organizations provides researchers with a chance to view how organizational structure is impacted by ERP shortly after it goes into Chinese organizations. However, having made a strong case that the organizational impact of ERP, in China, would make a potential focus for a new study, there is still a need to explore how the organizational impacts might best be modelled, and also to identify the possible antecedents and outcomes of both the ERP implementation and the organizational structure constructs. In the next sections, these important constructs, which provide added justification for this study, will be reviewed more explicitly.

2.6 The Structural Dimensions of the Organization

Various aspects of organizational structure have been studied in the past; most studies have focused on the elements of centralization, standardization and horizontal span of control. However, recent work has suggested that other structural issues are important to consider in ERP implementation. For example, horizontal integration, that is the cross departmental coordination and cooperation that can be facilitated by ERP systems, is an important element to consider, as are the new interdepartmental relationships that can develop (Davenport 2000b). The following section will consider each of the important dimensions of organizational structure.

Organizational centralization is one structural dimension that has been intensively
explored by various studies of IT in organizations [See Pfeffer and Lebibici 1977; Zeffane 1989; Whisler 1970; Spanos et al 2002; Robey 1977; Klatzkev 1970; Pinsonneault and Kraemer 1993a]. It is a structural dimension that focuses on how the decision rights are distributed in an organization. Pugh et al (1968) argued that centralization emerges as a result of creating a locus of authority to make decisions. Hage and Aiken (1967) defined centralization as the upward locus of decision making power in the organization. As can be seen in Table 2.1, most past studies of IT in organizations focus on how the adoption of IT will influence organizational centralization. But the results are divergent and it seemed desirable to investigate this issue in this research. Interestingly, (Child 1969) has argued that there is a negative association between centralization and standardization. For example, he suggested that if IT [in this case ERP] introduces a more standardized structure, then the adopters will also tend to decentralize their decision making practices. Standardized working practices help senior managers to have confidence in their control over an organization and so they are more likely to decentralize decision making responsibilities. This issue was also explored further as part of the study.

Formalization and standardization are two elements that strongly reflect structural activities (Pugh et al, 1968). Formalization denotes the extent to which rules, procedures, instruments and communications are written. For example, Pennings (1973) measured formalization mainly by job codification, rule, and written communication and job specificity as well. Dalton et al (1980) defined formalization as the extent to which appropriate behaviour is defined in writing. Dalton et al (1980) also argued that standardization is closely related to formalization, but rather than focusing on what someone is asked to do, their role and the rules surrounding that role, standardization refers to how one carries out that role. Due to the close linkage between standardization and formalization, recent studies have integrated the two dimensions into one (Ferrell and Skinner 1988).

At the same time, the horizontal span of control within an organization reflects how many members of staff are controlled by one manager, whilst the vertical span of control reflects the hierarchical layers between the top manager and the shop-floor (Pugh 1997). Recent work has postulated that the adoption of ERP is enabling adopters to downsize and flatten their organization (Fahy 2001; Hall 2002; Wainwright and Waring 2004), which inevitably introduces changes to the horizontal and vertical span of control. Thus, it was considered desirable to test through the empirical work for this study whether the adoption of ERP changes these two
aspects of organizational structure.

Surprisingly, few empirical studies have investigated the degree of horizontal integration among the functional departments. The importance of the interdepartmental relationship is now more widely recognized (Wijnhoven and Wassenaar 1990; Davenport 2000a; Umble et al. 2003; Amrani et al. 2006), and so any study into the impact of IT in organizations needs to explore the influence of this dimension. This is particularly the case for ERP as these systems emphasize interdepartmental coordination and cooperation (Kumar and Van Hillegersberg 2000). Although recent study of Amrani et al (2006) didn't explore the impact of ERP adoption on organizational horizontal integration, their work suggested us the importance and necessity of the study of this topic. They argued that ERP system, as a kind of IS integrating different functional departments together through the components 'software modules, can potentially influence the coordination, cooperation and information flow across functional departments. At the same time, Koch and Buhl (2001) have suggested, concluding from their case studies, that ERP fails to significantly influence cross-functional team working, so the literature on this issue is not in agreement. In order to explore this issue and provide a more comprehensive understanding of this topic, this study will investigate how ERP implementation impacts upon horizontal integration.

The relationship between ERP and organizational structure represented by the four structural dimensions of organizational configuration, the degree of centralization, levels of standardization and horizontal integration [the latter being specifically added in order to explore whether ERP has a significant influence on horizontal coordination and cooperation] has formed one of the main themes of the research, along with the relationship between ERP and strategy and ERP and organizational flexibility.

2.7 Organizational Strategy

Organizational strategy is one factor that has been largely ignored by previous studies of IT in organizations, as seen in Table 2.1. By focusing on only one or two of the relationships between IT and organizational structure and by not exploring the influence of organizational strategy, a potentially important antecedent of both, previous research has failed to fully develop our understanding in this area. No other study prior to this research has been designed in such a way as to link ERP
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and organizational strategy together and to provide empirical evidence on whether or not ERP adoption is ultimately influenced by organizational strategy.

Miles and Snow (1978) argue that strategy is of significant importance for the study of IT in organizations. Miles and Snow's strategy typology clearly links the different strategy approaches with a corresponding structural arrangement that they suggest is characteristic of that particular strategic approach. For example, according to Miles and Snow (1978), organizations who adopt a 'Defender' type strategy will only focus on a narrow product market scope; such companies commonly focus on the current market and aggressively protect their own domains; the main characteristics of companies that adopt a 'Defender' type strategy can be summarized as:

1. Adopting a single core technology in order to pursue internal technological efficiency.
2. Having a stable organizational structure
3. Undertaking intensive planning, focusing on core issues (not an extensive and wide ranging planning process that affects many different business activities).
4. Having an internal organizational structure that is based around business functions—not a process-oriented enterprise structure.
5. Having a high degree of formalization surrounding job roles, i.e. roles are highly specified.
6. Senior management retain centralized control
7. Information flows vertically within the organization.
8. Simple and inexpensive approaches to coordination are adopted.

In contrast, the companies that adopt a 'Prospector' type strategy usually have a large domain of products; they actively seek new market opportunities. The main characteristics of 'Prospector' companies could be described as follows:

1. The organizational structure and their approach to technology is not as stable as 'Defender'.
2. They have considerable expertise in marketing, research and development.
3. Their planning activities cover a broad spectrum of activities, but planning is not as intensive as 'Defenders'.
4. They organize their structure around their products.
5. There is less division of labour, low formalization and a decentralized organizational structure.

6. They adopt a more complex approach to coordination than 'defenders' which is also more costly.

By contrast, the 'Reactor' and 'Analyzer' strategies are the two that lie in between the 'Prospector' and 'Defender' strategies (Mintzberg et al. 1998). Companies adopting these strategies take less risks and so often make fewer mistakes than companies with a 'Prospector' type strategy, but at the same time 'Reactor' and 'Analyzer' companies are less committed to maintaining stability than a 'Defender'. In particular, companies with an 'Analyzer' approach to strategy tend to be the second or the third entrant in a new market. Such companies tend to expand into a new area that is close to their existing core competences and to develop products closely related to their existing market. 'Analyzer' companies move only after they are sure of the timing. Among the four strategy typologies, 'Reactor' seems the least effective affective approach; such companies seem only to react to events, and to have no clear direction or focus.

In addition, Karimi et al (1996) pointed out that the strategy typology offered by Miles and Snow (1978) is an appropriate way to view a firm as an integrated system in a dynamic interaction with the environment. By contrast, Porter (1980) has been criticised as he only describes a firm 'in relatively general terms, and [the framework] seems to be limited to explaining the competitive market behaviour of large firms' (Smith et al 1989: p63). Furthermore, the survey study of Doty et al (1993) indicated that Miles and Snow's strategy typology is the more effective predicator of firm's performances. Moreover, the Miles and Snow's strategy typology has long been recognized by the IS research. Whilst some of theoretical works [See Tavakolian (1989)] have attempted to link their strategy typology and IT structure, a large number of research studies (Karimi et al. 1996; Sabherwal and Sabherwal 2005; Kim 2006) in IS area also adopted the strategy typology of Miles and Snow (1978). In addition to above mentioned advantages, the Miles and Snow (1978) scheme had been empirically tested in the transitional countries by other scholars (Desarbo et al 2005; Peng et al 2004). Though these studies were not to link organizational strategy, structure and ERP together, they provided confidence for the application of the general framework of Miles and Snow (1978) in Chinese organizations. Consequently, by employing this same framework, the outcomes of this research can be more easily compared with other work.
Finally, another advantage associated with the Miles and Snow (1978) scheme is that it has provided a theoretical linkage between organizational strategy and structure. An organization can manipulate its organizational structure in order to achieve strategic objectives (Burns 1961). Thus, to a large extent, structure needs to follow strategy (Lynch 2000). According to Miles and Snow (1978), the 'prospectors' organizations are liable to adopt a more decentralized and less formalized organizational structure with the emphasis on the interdepartmental communication. By contrast, 'defenders' organizations, similar to the bureaucratic organizations who arrange their structures in pursuit of efficiency, emphasize the centralization of decision making and the standardization of organizational activities. Therefore, in Miles and Snow (1978) scheme, different organizational strategy typologies prescribe a specific type of structural arrangement.

2.8 Organizational Flexibility

Closely linked with organizational structure, the degree of flexibility within a firm is of strategic importance particularly in today's volatile economic environment. Flexibility is defined by Upton (1995) as the ability to change with little effort in terms of time, cost or performance. He pointed out that flexibility should cover two aspects, namely the organizational capability of changing its operation policies and structures, and how well an organization can change its production capability (Upton 1995).

The ability to change organizational policies and structures has been widely studied and many authors have recognized the relationship between organizational elements such as organizational culture and structure (Blau 1960; Harvey 1968; Blau 1970; Child 1973a; Galbraith 1973; Hannan and Freeman 1977; Egelhoff 1982; Child 1984; Mansfield 1984; Harrington 1991; Cyert and March 1992; Fincham and Rhodes 1999; Englehardt and Simmons 2002). This body of research suggests that the flatter and more decentralized an organization the more responsive and flexible to change it will be. Taller organizational structures tend to be associated with centralized decision making and whilst such a structure can help organization to reduce uncertainty, there will also be an increase in the time needed to respond to external demands; consequently these structures will reduce the organizational flexibility (Thompson 1967; Glueck and Dennis 1972; Hannan and Freeman 1977; Child 1984; Miller 1987; Galbraith and Lawler 1993; Miles and Snow 1995).
Research by other authors has suggested that a process-oriented enterprise with emphasis on the horizontal relationships across departmental boundaries is a more flexible structure (Burns 1963; Fincham and Rhodes 1999; Davenport 2000a). The reason underlying this rationale is that in a process-oriented environment, different functional departments should work together in order to respond to the external environment, rather than complete their own tasks independently, as is often found in a more functionally structured company (Amrani et al 2006). Interdepartmental coordination and cooperation is important if a company is to be able to respond to change in a complex environment (Burns 1963; Fincham and Rhodes 1999; Amrani et al 2006). ERP systems have also been used to support Business Process Re-engineering with the purpose of streamlining the organizational processes, this too can ultimately improve organizational flexibility through better interdepartmental coordination and cooperation (Davenport and Short 1990; Short and Venkatraman 1992; Robey et al. 1995; Hammer 1996; Sampler 1996; Wainwright and Waring 2004).

By contrast, there has been very little research undertaken into production flexibility which is mainly focused on manufacturing technologies and techniques (Upton 1995). This might be due to the fact that, unlike organizational flexibility that concerns change to the whole organization, production flexibility relates to only a few aspects of an organization. However, production flexibility is, to some extent, an indicator of an organization's capability when adjusting its products and productions to meet market demand, so this study did also consider production flexibility in exploring organizational flexibility.

Finally, it is also important to state that flexibility and certainty are two incompatible aspects of organizational management. The pursuance of one of them will be at the expense of losing the other (Galbraith 1967; Fincham and Rhodes 1999). In the business world, different corporate strategies are adopted depending on the balance between flexibility and certainty that is desired by the management. For example, a company that wants to emphasize flexibility would probably adopt a more 'Prospector' type strategy, whilst a company that wants to emphasize certainty would tend to adopt a more 'Defender' type strategy from the Miles and Snow (1978) typography described above.
2.9 Gaps in the Literature

Without question, the topic of the relationship between IT and organizational structure is not new. But the research published to date does not offer us an account of ERP in China and specifically how strategy and ERP might impact on each other. This research has targeted these gaps in the literature in order to make a significant contribution to the field.

2.9.1 Overemphasis of the Physical Arrangement of IT

Earlier in Section 2.2.2 it was argued that the fast development of IT has created a challenge when considering how to measure its impact in organizations. Selecting only some types of IT seems inadequate [See Hoos 1960; Klatzky 1970; Storey 1987; Scheepers and Damsgaard 1997] and counting the number of computer terminals as the measure of IT, is today inappropriate [See Whisler 1970; Zeffane 1989] particularly with the development of the Internet. To a large extent such approaches assume that the IT itself, rather than the integration of the human organization with the human technology, can lead to a kind of uniform impact on organizational structure. Grint and Woolgar (1997) have pointed out that the complexity in interpretation of the impact of human made technologies can lead to different perceptions of the usefulness and benefits gained from technology [See also Woolgar 1988; Orlikowski 1992; McLoughlin 1999]. Therefore, it has been deemed necessary to measure not just the physical aspects of IT but also realized benefits for the adopter company. This issue is further discussed in the next chapter. By adopting this approach, the research has explored how the scale of IT implementation influences both the organizational structure and the benefits realized.

2.9.2 The Structural Dimension

As already discussed many recent studies have failed to take into account the many different relationships between IT and organizational structure. Issues such as the centralization of decision making and formalization have been the most often tested relationships [See Robey 1977; Pinsonneault and Kraemer 1993a; Pinsonneault and Kraemer 1997; Argyres 1999; Spanos et al. 2002]. Other important structural dimensions such as departmentalization, standardization, span of control and the lateral relationships within a company have typically been ignored. This concentration on one or a few measures of structure makes it difficult to find the
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interlinked relationship of the impact of IT (Robey 1981). Miller and Friesen (1982a) have argued that the inclusion of more factors could help us get more satisfactory empirical findings and that it might be desirable to include as many as possible structural dimensions in a study to find out the different influences of ERP within an organization.

There is then a lack of understanding of the general impact of ERP on different organizational structural elements. The impact of ERP on structure is not a once-for-all adjustment and the implementation of ERP will demand massive organizational changes (Newman and Westrup 2005). The change of IT system occurs alongside the change within the organizational structure (Fahy 2001). The newly structured organizational form results from an ongoing process. This is because interpretation of IT is a function of time (Orlikowski and Robey 1991; Orlikowski 1992). Unfortunately, most studies have focused on the topics relating to how ERP should be implemented in organizations (Klaus et al. 2000). Some authors have called for more academic studies on the performance impact of ERP (Kennerley and Neely 2000) and the impact of ERP on organizational effectiveness (Hedman and Borell 2002). Davenport (1998) has referred to the topic of structural issues but the focus for him is how to arrange organization structure to control the implementation rather than how the whole organizational structure might be changed after the implementation of ERP.

It is important to also recognize that the lack of academic studies on the organizational impact of IT may reflect the underlying assumptions of scholars. Namely, most researchers have assumed that the adoption of ERP in organizations is the same as, or similar to, that of other forms of IT. Bancroft (1998), for example, regards the adoption of ERP as being similar to past large IT projects. In contrast Skok and Legge (2001) suggest that ERP projects are bigger and more complex than other traditional IT projects. The implementation of an ERP system will influence the whole organization and so will need a long term strategic plan in order to manage the many issues that will arise. Also the large temporal and spatial distance challenges often associated with ERP projects demand much more concentration and energy than ever before (Markus et al. 2000a). Boudieau and Robey (1999) also argued that ERP has the potential to transform organizations by its distinct advantages over traditional IT. Hanseth et al (2001) report that a large volume of academic articles only focus on implementation issues such as CSFs and how to avoid traps; they point out that ERP research needs to investigate a wider
range of issues. Further, they suggested that a full understanding of the potential of ERP is what is needed from future research. The distinct affordances offered through ERP (Hutchby 2001a; Hutchby 2001b; Hutchby 2003) and the large failure rate of ERP implementation (Ehie and Madsen 2005; Sammon and Adam 2005; Koh et al. 2006; Muscatello and Parente 2006; Woo 2007) demand further study in order to understand how the specific characteristics offered by ERP interact with organizational practices.

2.9.3 Research on ERP's Impact in China

Although there are large number of studies with respect to ERP in Western countries, few studies have been focused on developing countries (Kumar and Van Hillegersberg 2000; Huang and Palvia 2001; Balsmeier and Nagar 2002). In addition, research that has been undertaken investigating the impact of ERP implementation in China to date has not explored the impact of ERP on the structure of the host organization and this is an important issue due to the different approach to organizational hierarchy, flexibility and to personal relationships that the Chinese have when compared to western companies, where most of the published research has been conducted. It is important to understand if there are any potential conflicts between the management philosophy embedded in ERP and Chinese management practices; if the context in which IT is implemented has a significant influence on the effectiveness of IT in organization, particularly with regards to the different company ownership structures found in China (Boisot and Child 1996; Martinsons 2004). It may well be that the differences between Chinese and Western cultures will considerably influence the effectiveness of ERP. Even if there are no problems for the adoption of ERP in Chinese organization, it is still reasonable to argue that organizational structure will need to be adjusted after ERP implementation and that this may take place in very different ways in a Chinese context.

2.9.4 Methodological Monotony

The study of the organizational effect of IT implementation began with the introduction of IT into organizations in the 1950s (Leavitt and Whisler 1958), and much work has been done on this topic. Despite this, the relationship between IT and organizational structure is not yet clear and this is due in part due to inherent weaknesses in the studies themselves. Past studies in this field can be divided into two categories according to when they were undertaken and also the methods that they employed. Most early studies employed a quantitative approach underpinned
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by positivist research assumptions with the purpose of generalizing from research findings to other situations. This methodological choice limits the contextual understanding that is gained through undertaking the research [This issue is discussed in more depth in Chapter 4]. Later studies have employed a more interpretive approach and have employed qualitative research methods. While qualitative methods do offer insight into the 'meaning' of IT in organizations (Rose and Jones 2004), case studies offer little in terms of generalisability.

There is then a methodological monotony within the literature and this impedes researchers from fully appreciating the impact of IT on organizational structure. The complementary roles of quantitative and qualitative studies demand a mixed methodology so that an appreciation of the social meaning of IT is gained alongside the production of measurable results that provide findings which can be applied to other situations. Without both we cannot get a satisfactory understanding of the organizational impact of IT.

In view of this, this study has employed both quantitative and qualitative methods following the suggestions from Mingers (2003; 2004a; 2004b) and also Bhaskar's (1975; 1979; 1989; 1993). The quantitative study was directed at finding regularities within the research results and the qualitative work, undertaken after the survey had been completed, explored both the meaning of the quantitative results and the divergences between the research model [Discussed in Chapter 3] and the empirical data. The methodology adopted in this research is discussed in full in Chapter 4 and the results of the research are discussed in Chapters 5-7.

2.10 Contributions of This Research

It was envisaged that the research, presented in this thesis, would make a number of important new contributions, primarily in the following areas:

1. It is clear that past studies of ERP have focused mainly on a fairly narrow range of issues such as ERP implementation and competitive advantages potentially offered. The absence of any clear understanding of how ERP might influence organizational structure, both within the academic and practitioner communities, might be one latent reason accounting for the significant failure rate of ERP projects (Sammon and Adam 2005; Koh et al. 2006; Basoglu et al. 2007; Woo 2007) Thus, this project aimed to generate a...
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rich and comprehensive understanding of the impact of ERP deployment on a range of different organizational structural dimensions.

2. In order to get a more complete understanding of the structural impacts of IT, in general, and ERP, in particular, it has been necessary to adopt a more sophisticated way of modeling and measuring the technical artifact. To this end, ERP deployment will be assessed, using a simple dichotomous measure of adoption, a physical measure of the scale of the ERP implementation, and a measure of its success, in terms of the benefits ultimately realized.

3. In contrast to most previous studies of IT in organization, this research has explored a wider number of relationships between IT and organizational elements. For example, the primary relationship between ERP deployment and structural design, will be complemented by introducing a ‘corporate strategy’ construct, as a potential precursor of both, and an ‘organizational flexibility’, as a possible antecedent of both.

4. Finally, extra interest and value should be realized from this study by situating it in China, a developing country with a distinctive culture.

In the following chapter the research model, which has been explicitly designed to guide the research, and in so doing deliver these contributions, is presented and justified.
Chapter 3—Research Framework

Chapter 3

Research Framework
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3.1 Introduction

In Chapter Two, the literature relating to organizational impacts of IT, in general, and of ERP, in particular, were reviewed, which led to the identification of the research gaps in the area. This chapter describes the research framework from which the whole research project has been developed. To this end, the remainder of this chapter is structured into four sections. Section 3.2 introduces the aim and objectives of the research, developed in accordance with the gaps identified in last chapter, and the envisaged contribution of this project. Following this, Section 3.3 describes the research hypotheses that have been developed to direct the field data collection. This section also presents the research model for the whole project, which illustrates the conceptual framework of the project and is linked with the hypotheses. Finally, Section 3.4 provides an overview of the whole chapter.

3.2 Aim and Objectives of the Study

The broad aim of this research project has been to generate a more comprehensive understanding of the relationships between ERP, strategy and organizational structure, predominantly by exploring the regularities and recurrent phenomena that underpin the relationship between organizational structure and ERP. The reason that the project has sought to identify such regularities and recurrences (Bhaskar 1975; Bilton et al. 1987), is in order to provide important new insights into the nature and form of the relationship between ERP and structure. In addition, this study seeks to explore the reasons underpinning those recurrences and regularities, first by comparing the quantitative data findings to the original research hypotheses, and then by undertaking further qualitative work to generate better understanding of the issues and also to investigate some of the unexpected findings from the quantitative work. To help structure and focus the conduct of this study, the broad research objective has been broken down into following five distinct objectives.

Firstly, following the Miles and Snow (1978), this study will explore how organizational strategy will influence the four structural dimensions, namely organizational configuration, centralization, standardization and horizontal integration. The reason to do this is because different strategy typology will dictate different structural arrangement (Miles and Snow 1978), which will subsequently contribute to the degree of organizational flexibility.
Secondly, this study will also look at the relationship between organizational strategy and ERP implementation. By so doing, this study can provide insight into how ERP deployment including the mere adoption of ERP, ERP physical scale and ERP benefits would be influenced by organizational strategy.

Thirdly, to date, there has been little empirical research that explicitly explores the influence of ERP on organizational structure. Although researchers have noticed the larger failure rate of ERP (Amoako-Gyampah 2004; Briggs and Shore 2007; Woo 2007), these studies have focused mainly on ERP implementation topics rather than on how to integrate ERP system with organizational structure. Thus, one of the main objectives of this study has been to generate understanding of the impact on ERP on the same four structural dimensions [Namely, organizational configuration, centralization, standardization and horizontal integration].

Fourthly, it was expected that by looking at the relationship between organizational structure and flexibility, this study would shed light on how organizational strategy directs organization's structural arrangement so that the organization can gain the degree of flexibility they seek. Consequently, this study is able to provide an overview of relationship between organizational strategy, structure and ERP.

Fifthly, present ERP research (Curran et al. 1998; Keller and Teufel 1998) have argued that the adoption of ERP can help improve organizational flexibility. Therefore, the fifth objective of this study has been to provide empirical data on how ERP can influence organizational flexibility.

Finally, it was envisaged that by explicitly addressing these research objectives, this study would also be able to generate other additional important research findings. For example, previous studies investigating the impact of IT on organizational structure have focused on measuring only the physical scale of the IT, such as the number of workstations, or number of departments involved in the implementation [See Zeffâne 1989]; this research adopted a broader approach, measuring the physical scale of the ERP implementation in order to facilitate comparison with other studies, but also the benefits of the ERP implementation were measured. By so doing, it is expected that this study would offer insight whether or not ERP benefits, in particular, and IT benefits, in general, might provide alternative measure of IT for subsequent studies in this area. Furthermore, it was expected that the study would provide additional understanding of how ERP is run in Chinese companies through
the qualitative interviews (Huang and Palvia 2001; Roldan et al. 2002; Tarafdar and Roy 2003).

In sum, whilst this study focuses on the structural impact of ERP system, it was expected that this project would also generate the understanding of the relationship between strategy, structure, ERP and organizational flexibility. And via qualitative method, also provide insight into the application of ERP system in Chinese context.

3.3 Hypotheses and Models

In this section, the hypotheses and research model will be set out. In order to derive the hypotheses, a comprehensive literature review was first undertaken [See Chapter Two]. These hypotheses have played a critical role in this research, as they have been used to explicitly guide the construction of the questionnaire and interview questions.

Broadly speaking, the research model of the study is composed of five pairs of the associations, as encapsulated in the research objectives. First of all, the research model focuses on the influences of organizational strategy on structural dimensions and ERP. In Chapter Two, it has been argued that these two pairs of relationships can help develop our understanding of how organizational factors might be influenced by organizational strategy. Next, the research model highlights the relationship between ERP and organizational structure as being of importance. This relationship is central to the study since the research aims to explore the structural impact of ERP system. Finally, the model sets out the potential influence of organizational structure and ERP on organizational flexibility; it was expected that the ERP and structure should be arranged in accordance with the strategy and thus give rise to the degree of flexibility that organizations are ultimately able to leverage.

3.3.1 Strategy and Structure

It has been argued that organizational strategy will strongly influence the arrangement of the structure (Lynch 2000) of an organization. In particular, the configuration theories clearly suggest that organizational structure should be arranged in such a way to serve its strategy and strategic priorities (Doty et al. 1993). For this study, the strategy typology suggested by Miles and Snow (1978) has been adopted. Ginn (1990) argued that Miles and Snow’s work could be said to be one
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dimensional and consequently their four distinct strategic typologies could be put sequentially onto a single continuum, with the ‘Prospector’ and ‘Defender’ strategy at either end of this continuum. Consequently, for the purpose of this study, strategy has been modelled, based upon Ginn (1990) continuum, in terms of the extent to which an organization’s strategy tends towards either the ‘Prospector’ or the ‘Defender’ archetype.

In terms of the impact of strategy upon structure, Miles and Snow (1978) argued that compared with the ‘Defender’ organizations, the ‘Prospector’ will adopt a structure that is flatter, more decentralized and will emphasize the horizontal relationship. Although Miles and Snow (1978) suggested that a ‘Prospector’ strategy adopter commonly has a less standardized structure, this study will not adhere to this orthodoxy. This is because organizational centralization and standardization are both aspects of organizational control. Child (1977) pointed out the negative association between the degree of organizational centralization and the levels of standardization. That is, the more centralized structure will always have less standardized working practices whilst a more decentralized structure will typically be associated with more standardized ways working. Since the ‘Prospector’ organization will demand a kind of decentralization, in order to cope with its ever changing environment, it can be argued that the ‘Prospector’ should adopt more standardized processes and practices (Child 1977), so that decentralization doesn’t lead to fragmentation.

Based upon this analysis, the following hypotheses with respect to the relationship between organizational strategy and structure have been derived:

- **Hypothesis 1a**: Organizations that pursue the archetypal ‘Prospector’ strategy are likely to adopt flatter organizational structures, with an extended span of control.
- **Hypothesis 1b**: Organizations that pursue the archetypal ‘Prospector’ strategy are more likely to introduce highly standardized working practices.
- **Hypothesis 1c**: Organizations that pursue the archetypal ‘Prospector’ strategy will typically decentralize their decision-making rights.
- **Hypothesis 1d**: Organizations that pursue the archetypal ‘Prospector’ strategy are likely to be associated with effective horizontal integration between functional departments.
3.3.2 Strategy and ERP

The significant investment required to implement an ERP project demands a strategic emphasis (Ragowsky and Somers 2002; Muscatello et al. 2003; Ettlie et al. 2005). Academic researchers in the IS area argue for ‘strategic fit’, in which IS should be aligned with their strategic objectives (Earl 1989; Earl 1993; Jordan and Tricker 1995; Earl 1996; Beard and Summer 2004). In view of this, it is proposed here that in order to serve the strategy, organizations will need to configure their ERP implementations in accordance with their strategy. For example, the ‘Prospector’ strategy, in Miles and Snow’s scheme (1978), is a strategy found when managers are in pursuit of new emerging opportunities. This strategy encourages a company to adopt a lean structure in order to take advantage of continuously emerging opportunities (Laurence 2000). At the same time, ERP system can be implemented on different scales. Organization can adopt some or all of its standard modules. It can also customize ERP system to certain extent (Callaway 1999; Carton and Adam 2003; Olhager and Selldin 2003). All of these potentially serve organizational strategy to different degree. Consequently, ‘Prospector’ is more likely to attempt a full implementation of ERP covering more aspects of its daily operation, by which large part of organization is covered and integrated by ERP system, in order to fully benefit from the business advantages associated with standardization, process orientation and integrated information (Stratman and Roth 2002; Sarkis and Sundarraj 2003). To explore these issues further, the following hypothesis has been developed:

- **Hypothesis 2**: Organizations that follow a ‘Prospector’ strategy are more likely to deploy ERP systems.

3.3.3 ERP and Structure

The relationship between ERP and structure forms the core of this study. In this subsection, the hypotheses that reflect the relationship between ERP with levels of hierarchy, centralization, standardization, and horizontal integration will be presented in detail.

3.3.3.1 ERP and Configuration

Hierarchically organized organizations are always criticized for the distortion of information (Campbell 1979; Fincham and Rhodes 1999). This is because there will
be many interfaces for information relaying (Keller and Teufel 1998). The process-orientation of ERP can be used to reduce hierarchy by replacing human interfaces with a central information database and powerful IS covering all aspects of organizational control (Sia et al. 2002). The downsizing effect of ERP itself, which comes from rationalizing and redesigning the main processes of organization (Hall 2002), will be a source for reducing the level of hierarchy. In fact, this process-philosophy, per se, is a management practice that is, of necessity, underpinned by flatter organizational forms (Keller and Teufel 1998). Besides ERP's communication function, its effective information management and response facilities can increase the staff's capability in dealing with daily operational issues and thus each employ is able to handle more workload than before (Hitt and Brynjolfsson 1997). Consequently, the horizontal span of control can be reduced. Based on this analysis, it is possible to propose the following hypothesis:

- **Hypothesis 3a:** The deployment of ERP will be associated with a reduction of levels hierarchy, and a decrease of span of control.

It should be noted that a further important objective of this study embedded in this hypothesis, namely to explore whether ERP benefits can be a better alternative predictor of the impact of ERP and this thus contributes to the measurement of IT for subsequent studies in this area. In order to serve this end, it is necessary to compare how ERP physical scale and ERP benefits will influence organizational structure. In addition, if condition permits, it is also desirable to look at how the mere existence of ERP can influence organizational structure. By so doing, the study can explore what might be the different impacts of ERP on organizational structure through its mere existence, through ERP scale of its adoption, and through its success, as measured by ERP benefits. Thus, the term 'ERP deployment' in this hypothesis, is used as a catch-all term, which includes these three variables, and these three measures have been used in all hypotheses, with respect to the structural impacts of ERP.

### 3.3.3.2 ERP and Standardization

As an integrated information system, ERP demands a highly standardized technical environment and thus implies a need for standardization of the task environment. Being an integrated IS, ERP admits user's access from multi-places and at multi-levels (Markus et al. 2000a). So, organizations need a specific policy, which
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details the procedure and rules for accessing, retrieving and changing data (Al-Mashari 2002). Adam and O'Doherty (2000) pointed out that one reason that organizations would like to proceed with the difficult ERP system is because ERP can potentially link whole organizational together and thus enable the more standardized working practices. This is one benefit that organization can gain from ERP adoption (Callaway 1999; Beard and Summer 2004). As argued by Gattiker and Goodhue (2004), the adoption of ERP means that organization will have to move from a 'loose coupled' system to a 'tightly coupled' one. In order to achieving this movement, ERP adopters will be required to standardize their working practices and business interfaces (Jacobs and Bendoly 2003). That is, ERP implementation demands standardization in order to reduce the organizational process variants (James and Wolf 2000). Based upon this analysis, the following hypothesis can be postulated:

**Hypothesis 3b:** The deployment of ERP will increase the degree of standardization of working practices and employee activities.

3.3.3.3 ERP and Centralization

The impact of IT on decision-making has long been the focus of a wide variety of organizational studies (Whisler 1970; Pfeffer and Leblebici 1977; Robey 1981; Dawson and McLoughlin 1986; Zeffane 1989; Wijnhoven and Wassenaar 1990; Lal 1991; Spanos et al. 2002). There are two distinct arguments on this topic. Leavitt and Whisler (1958) insist that since senior manager would like to have more control over their own decision making, provided there is enough computing capability, IT should facilitate the centralization of decision making. Whisler (1970) was able to find important support for this view, as later he found IT-enabled centralization of decision making in subsequent empirical studies. However, there are two lines of argument that run counter to this. The first one is the 'cascade effect' which describes a situation where higher level officers use IT to delegate more authority to the lower level staff (Klatzky 1970). In contrast, Pfeffer and Leblebici (1977) suggest that since managers could collect information relating to their responsibility more easily, through the use of IT, managers would like to supervise and control employees by results rather than during processes, which enable a more decentralized organizational structure.

It has been reported that ERP, a kind of powerful IS, leads to greater surveillance of
staff (Davenport 2000b), which then enables ERP adopter to decentralize its decision making, as argued by Pfeffer and Leblebici (1977). At the same time, a process philosophy demands empowerment in the organization (Keller and Teufel 1998). Furthermore, it has been found that the structuring of activity and locus of decision-making is inversely related (Child 1972). That is, the more standardized, specialized and formalized the organization is, the more decentralized the decision-making should be. Accordingly, ERP can potentially help decentralize organizational decision making since ERP is a kind IS that can highly standardize organizational working practices (James and Wolf 2000; Hall 2002; Jacobs and Bendoly 2003; Beard and Summer 2004). Consequently, it is postulated that the adoption of an ERP system will empower staff, offer more autonomy and in consequence, facilitate the decentralization of decision making.

- **Hypothesis 3c**: The deployment of ERP will facilitate more decentralized forms of decision-making to be adopted, within organizations.

### 3.3.3.4 ERP and Horizontal Integration

Besides the above dimensions of organizational structure, others should also be taken into account in order to cope with the so called “paradigm shift” (Kuhnert and Lewis 1987). The newly developed organizational form (Snow et al. 1992; Miles and Snow 1995; Chung et al. 2004) enabled by ERP is very different to a traditional functional structure. For a process-oriented structural philosophy, cross-functional design and integration are becoming increasingly important (Davenport 2000b). However, few tested measures of horizontal integration have been developed through past empirical studies. Markus (1984) points out the necessity of exploring horizontal relationships to better map today’s organizational structure. She (1984) suggested that Galbraith’s (1973; 1975; 1977) studies of organizational structure and IS neglect the contribution of IS to horizontal relationship management and cross-functional coordination (Markus 1984). Markus (1984) further argued that, although there are a large number of studies on organizational impact of IT, few considered how IS changes horizontal relationships. In view of this, this research will explicitly address this important area of structural impact.

Since an embedded process-philosophy entails cross-functional coordination and communication (Keller and Teufel 1998; Oakland and Porter 2000), and since ERP enables this requirement, it is proposed that the adoption of ERP is positively
related to the level of horizontal integration and cross-functional communication. As to the mechanism of coordination, Burns and Stalker (1961) found that different means are developed to cope with different environments. The more demand for coordination from the environment, the more sophisticated the coordination mechanism would be.

But it is appropriate to argue that a process\(^2\) oriented ERP system will facilitate cross functional working only from above. Although an ERP system is designed according to a process orientation, this orientation is different from process management (Davenport 2000b). When implementing ERP, the main processes of an organizations are commonly mapped out and subsequently enacted though ERP will focus on providing support for process change (Davenport 2000b). It is important to consider the fact that the different modules of ERP systems are designed to satisfy the need of different functional departments. That is, ERP software is functionally structured, with modules to support and accommodate human resources management and etc. Because ERP offers a central common database (Callaway 1999) and due to its client/server architecture (Keller and Teufel 1998) it is possible for staff from different departments to access data easily, and less information is needed for coordination, therefore fewer physical coordination mechanisms are necessary. As a result, the ERP system rather than human staff provide the main information flow for processes.

- **Hypothesis 3d:** The deployment of ERP will increase the level of horizontal integration between departments.

### 3.3.4 Structure and Flexibility

The reason to revisit this topic is mainly because this research tries to link ERP, strategy, structure and flexibility together. It must be pointed out that the strategy typologies adopted from Miles and Snow (1978) cover more than organizational strategy. Indeed, Miles and Snow (1978) clearly stated that different strategy archetype will get different levels of flexibility, via their structural and/or technological arrangement. Thus, it is desirable and necessary to explore how organizational structure and ERP would be arranged by organizational strategy, and ultimately help organization gain their appropriate level of flexibility. In view of this, not only the

\(^{2}\) A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined input and output (Davenport, 2000).
relationships between strategy, structure and ERP would be explored, but also the influences of structure and ERP on flexibility will also be addressed.

The relationship between organizational structure and flexibility is not a new one. Academic studies have already singled out a kind of organizational form other than a bureaucratic structure: the organic organization (Burns and Stalker 1961; Burns 1963). Totally different from bureaucratic structure, an organic structure is much flatter, more decentralized and better coordinated across the functional departments, which enable organic organization to enjoy more flexibility, derived from its structural arrangement.

But as to the relationship between standardization and flexibility, there seems no one dominant argument. Because bureaucratic organizations are often associated with high degree of standardization, standardization was suggested to be factor inhibiting organizational flexibility (Fincham and Rhodes 1999). But since the samples of the study will be selected from the manufacturing industry where the environment is comparatively stable, the standardization is often regarded as one way to achieving manufacturing flexibility. Nagarur and Azeem (1999) pointed out that for manufacturing organizations, standardization can help reduce the system complexity and consequently increase organizational flexibility. Similarly, Eckerson (1989) reported how standardization had helped big organizations gain economy of scale and serve customers. These finally helped big organizations to gain the flexibility and responsiveness enjoyed by the small companies. In addition, Ramakumar and Cooper (2004) argued for the importance of standardization in order to achieve operational excellence and flexibility. They pointed out global value chain increases the complexity of organizational operations and thus without the aid of standardized rules organizations will suffer from this kind of complexity. Finally, Liker et al (1999) illustrated, through their quantitative studies, how standardization can help manufacturing organizations gain flexibility, which in turn facilitates innovation between organizational structure and flexibility.

Thus, in view of the above argument the following hypotheses, with regards to this relationship have been developed:

- **Hypothesis 4a**: The flatter the organizational configuration, the more flexible the organization would be.
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- **Hypothesis 4b**: The more standardized the organizational structure, the more flexible the organization would be.

- **Hypothesis 4c**: The more centralized the organizational decision making, the less flexible the organization would be.

- **Hypothesis 4d**: The better cross-functionally coordinated, the more flexible the organization would be.

3.3.5 ERP and Flexibility

Flexibility is a valuable capability worth attention in organizational settings (Thompson 1967; Keller and Teufel 1998). A high degree of flexibility is often essential for organizational survival and success, especially in circumstances in which the environment is characterized by high volatility. The ‘Adhocracy’ (Mintzberg and McHugh 1985; Ahuja and Carley 1999), the ‘organic organization’ (Burns and Stalker 1961) and ‘plastic structure’ are typical organizational forms found in volatile environments. Recent developments of IT offer a platform upon which organizations can undertake better surveillance of their environments and actively explore global market opportunities (Sia et al. 2002). An outsourcing policy and strategic partnership building, which used to be regarded as incompatible, with IT support can be combined in supply chain management (Strader et al. 1998).

Keller and Teufel (1998) have argued that the inherent characteristics of ERP enable organizations to be more flexible. The standard software, client/server architecture and modular design of ERP, in their opinion, make it possible for organizations to plug in/out of modules for different products. Furthering their argument, Keller and Teufel (1998) insisted that highly standardized and integrated ERP could help organizations react flexibly and adopt new organizational structures when needed. This stance is partly supported by Davenport (2000b) who argued that the standardization and integration of software in an ERP implementation makes it easier for an organization to adjust their structures, especially when compared with organizations whose flexibility is often limited by legacy system.

- **Hypothesis 5**: The deployment of ERP will result in a more flexible organization.
Figure 3.1: Research Model

- **ERP Uptake**
  - Existence
  - Scale
  - Success
  
- **Strategy**

- **Structure**
  - Configuration
  - Centralization
  - Standardization
  - Horizontal Integration

- **Flexibility**
3.3.6 Research Model and Summary

As can be seen from Figure 3.1, the research model is composed of five significant research objectives, each of which has been decomposed, where appropriate, into a number of distinct hypotheses [See Table 3.1]. First of all, it is argued that the strategy influences organizational structural dimensions and ERP scale. Secondly, it is hypothesized that both structural dimensions and ERP variables can influence the degree of flexibility to be enjoyed by organizations. Finally, as the core of the study, it is hypothesized that the ERP variables influence organizational structure. Therefore, both strategy and ERP influences the detailed design of organizational structure.

Table 3.1: Research Hypotheses

<table>
<thead>
<tr>
<th>Code</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Organizations that pursue the archetypal 'Prospector' strategy are likely to adopt flatter organizational structures, with an extended span of control.</td>
</tr>
<tr>
<td>1b</td>
<td>Organizations that pursue the archetypal 'Prospector' strategy are more likely to introduce highly standardized working practices.</td>
</tr>
<tr>
<td>1c</td>
<td>Organizations that pursue the archetypal 'Prospector' strategy will typically decentralize their decision-making rights.</td>
</tr>
<tr>
<td>1d</td>
<td>Organizations that pursue the archetypal 'Prospector' strategy are likely to be associated with effective horizontal integration between functional departments.</td>
</tr>
<tr>
<td>2</td>
<td>Organizations that follow a 'Prospector' strategy are more likely to deploy ERP systems.</td>
</tr>
<tr>
<td>3a</td>
<td>The deployment of ERP will be associated with a reduction of levels hierarchy, and an increase of span of control.</td>
</tr>
<tr>
<td>3b</td>
<td>The deployment of ERP will increase the degree of standardization of working practices and employee activities.</td>
</tr>
<tr>
<td>3c</td>
<td>The deployment of ERP will facilitate more decentralized forms of decision-making to be adopted, within organizations.</td>
</tr>
<tr>
<td>3d</td>
<td>The deployment of ERP will increase the level of horizontal integration between departments.</td>
</tr>
<tr>
<td>4a</td>
<td>The flatter the organizational configuration, the more flexible the organization would be.</td>
</tr>
<tr>
<td>4b</td>
<td>The more standardized the organizational structure, the more flexible the organization would be.</td>
</tr>
<tr>
<td>4c</td>
<td>The more centralized the organizational decision making, the less flexible the organization would be.</td>
</tr>
<tr>
<td>4d</td>
<td>The better cross-functionally coordinated, the more flexible the organization would be.</td>
</tr>
<tr>
<td>5</td>
<td>The deployment of ERP will result in a more flexible organization.</td>
</tr>
</tbody>
</table>
3.4 Summary

In this chapter the research model and hypotheses have been presented and this research framework has been used to guide the field data collection and data analysis. Generally speaking, the five groups of hypotheses link the variables into different pair of relationships to be tested by field data. As the core of the study, the hypothesized relationships between structural and EPR variables are the most important ones in view of the focus of the study. It was expected that the field data would shed significant light on the relationship between organizational structure and EPR, whilst provide insights into the understanding of other research objectives stated in Section 3.2.
Chapter 4

Research Methodology
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4.1 Introduction

Methodology has long been recognized as an important but difficult issue for studies in social science. This is because social science is very different from natural science (Alexander 1946; Machotka 1949; Hughes and Sharrock 1997) and cannot be treated as an 'exact science' (Alexander 1946). There is a lack of agreement concerning definitions and methods in this area. Some authors have argued that the reason for the difficulties with social science methodologies can be attributed to human subjectivity, or to the difficulty in understanding this subjectivity (Schutz 1970). Whilst others advocate that methodology needs to be customized in catering for different social contexts and situations of the research projects (Giddens 1974).

This Chapter aims to set out a coherent and systematic methodology for the study of the relationship between ERP and organizational structure. It is structured into further five sections. Section 4.2 sets out the underpinning research philosophy of this study. Section 4.3 justifies the selected mixed methodology for this project. Next, the detailed design of quantitative survey is presented in Section 4.4. Section 4.5 describes the design of the qualitative study and finally, Section 4.6 provides a summary for the whole chapter.

4.2 Research Philosophy

Social science has developed in order to undertake studies of human society, and as such differs in character from natural science. In social studies it is important to consider questions of ontology, that is the 'nature of being' and also of epistemology, the 'nature of knowing' (Comte 1973; Bhaskar 1989). In recent years, the ontological and epistemological basis of social science has been the subject of much rigorous debate, but there is still no uniformly agreed account of ontology and epistemology. Social science researchers have tended to split into two distinctly different camps: positivism and interpretivism (McNeill 1990; Saunders et al. 2000). From an ontological perspective, those who follow the positivist tradition, view reality as being independent of the researcher, by contrast, interpretivists consider reality as being subjective and social constructed (Orlikowski and Baroudi 1991; Brooke 2002). Epistemologically, and following their ontological assumptions interpretative researchers reject hypothetical deduction (Orlikowski and Baroudi 1991). Interpretivist researchers immerse themselves in in-depth studies to interpret subjective meaning (Giddens 1974; Harrington 2001) and so know reality from the
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perspective of people in the research situation. The difference between positivism and interpretivism can be seen in the approach these two different paradigm's require when investigating human society, positivists believe that the social world can be treated in exactly the same way as the natural physical world, whilst interpretivists argue that human society is distinctly different from the natural world (Champion and Stowell 2003).

Bhaskar (1979) argued that both positivism and interpretivism recognize only part of the truth of human society. He suggested that human society is composed of individuals and each individual's actions have a distinctive social meaning, but that this did not mean that the study of human society required a totally different ontological and epistemological foundation of social science Bhaskar (1975; 1979; 1989; 1993). Giddens (1968; 1973; 1974; 1976a; 1976b; 1977; 1979) agrees with this approach and although Giddens does not offer an ontological account of social science his argument against 'methodological individualism' suggests that while human society is composed of individuals, it is different from a single individual (Giddens 1976a; 1984; 1990). Thus it is reasonable to argue that although the action of single individual is unpredictable due to his/her 'free will' (Kagan and Havemann 1972; Bailey 1994; Hollis 1994), human society is not governed by this individual's 'free will. Instead, Bhaskar (1975; 1979; 1989; 1993) provides us the argument of 'critical naturalism', which recognizes the differences of human society but argues that the unobservable 'generative mechanisms' lead to the occurrence of certain social phenomena. In another words, these mechanisms underlie the regular occurrences of certain events. Therefore, social scientists are required to uncover such recurrences in order to uncover any universal law and in order to understand human society (Bhaskar 1975).

Consequently, as a social researcher, it is important to identify the statistically significant occurrences of any social phenomena we chose to study and it is also important for us to understand the social meaning of phenomena with the purpose of providing reasons for the occurrence of social phenomena (Hughes and Sharrock 1997). This would suggest that in order to undertake rigorous research, both positivist and interpretivist approaches should be employed in a study of social phenomena.
4.3 Mixed Methodology Studies

Mixed methodology studies in social science are advocated by several researchers in order to investigate a range of perspectives (Bryman 1988; Creswell 1994; Berg 1998; Tashakkori and Teddlie 1998), and also to combine results from different methods, to find regularities and recurrences, and so validate results through a process of triangulation. Indeed, some scholars in the area of IS studies have called for the mixed method approaches to be applied to their studies (Jick 1979; Mingers 2001; Amrani et al 2006). For example, Mingers (2003) recently argued that there is still a lack of a research applying multi-method approaches to the study of IT in an organizational context. Admittedly, the lack of multi-method studies, by itself, doesn't justify the adoption of mixed methodology for this project. However, the decision to adopt multi-methods on this project is based upon the need to take advantage of the distinct merits of both the individual methods ultimately employed.

4.3.1 Advantages and Disadvantages of Quantitative Research Methods

Quantitative and qualitative methods each have particular advantages and disadvantages (Saunders et al. 2000; Bryman 2006). The statistical power of quantitative methods enables the researcher to explore the recurrence of patterns, with respect to social phenomena (Weber 1968), and thereafter to discover the underlying 'generative mechanisms' (Bhaskar 1975). Indeed, the power of statistical analysis impressed the influential German sociologist Max Weber so much that despite his preference for the interpretative study of society he had to admit the usefulness of quantitative methods in the social research domain (Weber 1947).

Besides this, quantitative methods can be much cheaper to operationalize in comparison with qualitative methods. Researchers can collect large amounts of data in a relatively short time without incurring too much cost (Clover and Balsley 1979). Mail questionnaires are regarded as the only effective way to collect data from a large and highly dispersed group of informants (Sekaran 1992). Another distinctive advantage lies in the perceived objectivity of quantitative methods. The data collected using quantitative methods is less likely to be biased by individual judgement and embedded theoretical arguments (Easterby-Smith et al. 1991). Finally, due to the larger samples that can generally be collected through survey methods, it is argued that the research findings yield a higher level of generalizability (Bryman 1988).
Chapter 4—Research Methodology

Quantitative methods also allow researchers to collect large amounts of data and so offer the potential to uncover some inherent, underlying relationships between variables (Munch 1988). Consequently, these methods can easily accommodate a rich variety of variables in the embedded proposition, to facilitate the testing of a multitude of relationships.

The replicability of quantitative studies is also a very important perspective emphasized by methodologists for the accumulation of knowledge (Emory 1976; Bryman 1988; Zikmund 1991). For example, Miller and Friesen (1982b) advocated undertaking more quantitative studies in the field of strategy, to reduce specification error and to boost the generality and accuracy of findings. The harnessing of statistical power can help researchers uncover the regularities and recurrences that can't be found via a small number of case studies (Gellner 1985).

A further advantage of a quantitative approach is that it helps to overcome many of the inherent weaknesses of interpretative methods. A problem with the more subjective interpretivist approaches is that they require value judgements (Schutz 1967; Durkheim 1974; Hearn 1975; Oakes 1982; Brubaker 1984). For example, it is highly debatable whether 'thick descriptions' of social phenomena (De'souza and Williams 2000), and other strategies such as ethnographic studies, can offer an undistorted understanding of subjective meaning of agency. Overemphasis on meaning for individuals not only makes the study lose much of its predictive power, but also runs the risk of falling into 'Methodological Individualism' (Giddens 1976a; Giddens 1984; Luke 1987; Giddens 1990; Archer 1996). When undertaking studies, researchers may be tempted to choose data that supports their preferred idea, but then neglect or ignore any data that support a competing interpretation; this could mean that the researcher does not maintain objectivity when engaged in research.

However, as Williams (2000) has noted, different methods have their own particular strengths and it should be recognized that quantitative methods are cross-sectional in nature and fail to take into account the research context and subjective meaning of social actions (Taylor and Bogdan 1988). At the same time, quantitative methods have been criticized as offering only 'snapshots' of a situation or problem (Avital 2000) and such methods can potentially ignore variables that are not included in the research model. It should also be noted that although quantitative methods can help identify the correlations among variables, this approach provides little in the way of increased understanding of the direction of the causal relationship (Hair et al. 1998;
Chapter 4—Research Methodology

Field 2000; Saunders et al. 2000). However, traditional positivists might argue that the theoretically informed hypothesis can indicate the direction of causal relationship, leaving the statistical analysis for identifying the significant associations (Popper 1972a; Popper 1972b; Popper 1989). But it must be pointed out that the direction of causal relationship, informed by past theoretical works, might not be right. These weaknesses, therefore, should be made up for by qualitative studies.

In this study, it is assumed that there is always some underlying social universe underpinning totally different phenomena (Turner 1985; Turner 1987; Bourdieu 1989). The task of the social scientist is to uncover this underlying reason. For this reason, it was decided to undertake a quantitative survey research method as being a means of data collection that would offer the potential for generalization (Pettigrew 1987; Pettigrew et al. 2001).

4.3.2 Practical Merits of Qualitative Research Methods

By contrast, qualitative studies are appreciated by many authors, such as Yin (1994) and Glaser (Glaser and Strauss 1967) and Strauss (Strauss and Corbin 1998). For example, Yin (1994) favours the case study, because he regards this as the only exploratory tool for the study of a topic for which we have little understanding. In fact Burn and Stalker's (1961) work was a good example of the case study approach. They uncovered the 'organic' organizational structure, which assisted scholars in furthering our understanding of how organizational structures could be arranged to better cope with the changes of environment.

As an exploratory tool, the qualitative study can help researcher delve into a new area where there is little extant understanding. All knowledge begins with experience (Bourdieu et al. 1991). For some theorists, generating understanding and predicting are the two main aims for social studies (Weber 1968; Zikmund 1991; Bailey 1994). However, whilst both are important, generating understanding is a necessary prerequisite for the derivation of universal laws for predicting.

Another obvious advantage of qualitative research is that it can help researchers gain a deeper understanding of the research context. Without proper understanding of context, researchers cannot hope to interpret the subjective side of social life (Bryman 1988). Similarly, the organizational theorist Pettigrew (1987) argued for
processual and contextual study of dynamic change, for which qualitative research is very well suited. Therefore, qualitative research is appropriate when exploring issues such as power, culture and the social context of IT (McBride 1995). In addition, qualitative research methods can be used for longitudinal studies (Sekaran 2000).

However, Yin (1994) has argued that compared with survey methods, qualitative studies are of often far less rigor, and so provide less opportunity for generalization, moreover, he notes that is difficult to deal with large amounts of qualitative data without the help of an analytic scheme. Despite such shortcomings, qualitative research can be used to complement survey research, for the study of social phenomena. Although interpretative theorists have emphasized its usefulness for understanding subjective meaning and dealing with unique social context, it is not appropriate for generalization and finding explanation law underlining social phenomena.

4.3.3 The Choice of Mixed Methods for This Study

The practical merits and weaknesses of both qualitative and the quantitative research methods have been detailed in this section. It has been argued that quantitative methods are powerful in generating large amounts of data and then employing statistics to find the recurrences and regularities. Its usefulness in identifying causal relationships is also recognized (Weber 1947). But as stated, social science is not exactly the same as natural science. Research in this area should also aim to understand social meaning through exploratory tools such as qualitative methods. Consequently, it is desirable to adopt and combine these two complementary research methods, for this project, due to their distinct merits. Furthermore, the lack of multi-method approaches in previous IS research (Mingers 2003) provides an opportunity for important new insights to be gained through their utilization.

4.4 The Design of the Quantitative Study

In this project, the quantitative study will be used as the primary research tool by virtue of its statistical power. It is desirable to find significant associations between variables from the quantitative data. Only by this method will the conceptual framework be adequately tested. In this section, the general design of the
quantitative approach is presented and the constructs and variables to be used are critically reviewed.

The quantitative study was explicitly designed to test the hypotheses that were drawn from the literature, as previously presented in Chapter Three. As the first and the most substantive stage of the whole study, it was envisaged that the quantitative study would provide important new insights into the organizational impact of ERP, and in particular its generalized application and impact in China.

4.4.1 Questionnaire Design

A two step process was adopted to develop the content, in terms of item measures, for each of the constructs. The first step involved the definition of the domain of constructs [Refer to Table 4.1]. Churchill (1979) pointed out that conceptualizing the research domain should be done by consulting past literature. Thus, this study adopted previously developed definitional frames for the structural and strategy constructs. Meanwhile, definitions for other important constructs, such as ERP scale and ERP benefits, were based upon recent empirical studies of the adoption of ERP systems. Having defined each construct, in step two, specific items from each construct were selected. Churchill (1979) suggested that whenever possible, research should adopt existing item measures, for the constructs of interest, as the unnecessary use of new scales makes it difficult to compare and accumulate findings. Thus, the specific item measures for each construct in this study borrowed heavily from past studies. However, ERP systems have not been the subject of a long-standing stream of research and there are a relatively limited number of studies adopting survey methods. Consequently, ERP scale and ERP benefits items were developed by referring to the relevant theoretical literature. In order to maximise the effectiveness of any candidate item measures, the following questions should always be asked (Churchill 1979), in relation to each:

- Is the question necessary?
- Do respondents have the necessary information?
- Will respondents give the information?
- Is the item measure enough for representing the conceptualized construct?

For this quantitative study, the Likert scale was adopted as the primary mechanism for measuring each item. The Likert Scale is widely used within social science
studies and is regarded as a kind of dichotomous scale (Sekaran 2000). By adopting Likert scales, the study could easily measure the extent to which each respondent agreed or disagreed with statements relating to the subject matter of this study (Moser and Kalton 1971).

Table 4.1: Definitions of Research Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>The general structural framework by which the organization is arranged</td>
</tr>
<tr>
<td>Centralization</td>
<td>The degree to which the authority to make decisions is delegated at various levels</td>
</tr>
<tr>
<td>Standardization</td>
<td>The extent to which the procedures and rules are laid down for the job</td>
</tr>
<tr>
<td>Horizontal Integration</td>
<td>Integrating or linking together different parts of an organization to accomplish a collective set of tasks</td>
</tr>
<tr>
<td>Corporate Strategy</td>
<td>The basic characteristics of the match an organization achieves with its environment</td>
</tr>
<tr>
<td>ERP Scale</td>
<td>The scope and scale of an ERP implementation within the organization studied</td>
</tr>
<tr>
<td>ERP Benefits</td>
<td>The improvement of organizational management and operation through ERP adoption.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>A firm's ability to successfully accommodate changing conditions and to exploit new opportunities in a timely fashion, without incurring too much cost</td>
</tr>
</tbody>
</table>

After introducing the general principles, underlying the design each construct, the details of each of the questionnaire construct are presented in the following sections.

The Corporate Strategy Construct

The first section of the questionnaire related to strategy, and the different priorities organizations put on the different competitive factors in order to achieve their objectives. The specific questions used to explore a responding organization's strategy are detailed in Table 4.2 below:
Table 4.2: Strategy Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Our strategy is based upon the quality, rather than the price, of our products</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>We typically compete by introducing new products ahead of others, rather than by improving existing products.</td>
<td>Miles &amp; Snow (1978); Segars (2002); Beekun &amp; Ginn (1993)</td>
</tr>
<tr>
<td>3</td>
<td>Our strategy is based upon the production and promotion of a wide range of products</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>We compete by expanding into new markets, rather than by focusing upon existing ones</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>We always try to respond rapidly to new ideas from the environment</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>We always seek to adopt the latest forms of technology, at the earliest opportunity.</td>
<td></td>
</tr>
</tbody>
</table>

The Organizational Structure Construct

Following past studies, this study measured four dimensions of organizational structure, namely: the configuration of the organization, the degree of centralization, the degree of standardization, and finally the degree of horizontal integration. Whilst the concepts of standardization and centralization have been adopted directly from the work of Pugh et al (1968), the other two structural dimensions were added in to investigate how ERP can change the organizational span of control and the degree of horizontal integration. These last two constructs are particularly important because it has been suggested that ERP has the potential to laterally interconnect an organization's different functional departments as well as standardizing their working practices (Davenport 2000b).

The specific item measures, associated with each of these structural constructs are outlined below:

Configuration: In this study, the configuration of the organization refers to the general structural framework by which the organization is arranged. It is characterized by organizational levels of hierarchy, and the horizontal span of control. The questions used to explore this construct are presented in Table 4.3.
Table 4.3: Configuration Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Our organization has a very strong hierarchical structure, with many layers between the most senior and most junior employees.</td>
<td>Pugh et al (1968); Pugh (1997); Englehardt and Simmons (2002) George et al (1992)</td>
</tr>
<tr>
<td>2</td>
<td>Each manager has a very large number of subordinates reporting directly to them.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The structure of our organization is very flat.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>We try to minimize the number of subordinates reporting to any one manager.</td>
<td></td>
</tr>
</tbody>
</table>

Centralization: Concerns the degree to which the authority to make decisions is delegated at various levels. The items, as illustrated in Table 4.4, have been adopted from the work of Hage and Aiken (1967). By so doing, the validity and reliability of the construct has been enhanced, as all of these measures have been thoroughly tested in previous studies.

Table 4.4: Centralization Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>There can be little action taken in our organization until a supervisor approves the decision.</td>
<td>Hage &amp; Aiken (1967); Wang (2001)</td>
</tr>
<tr>
<td>2</td>
<td>Any employee wanting to make their own decisions would be quickly discouraged.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Even relatively minor issues have to be referred to someone higher up for a final decision.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Our employees generally feel empowered to take responsibility for making their own decisions.</td>
<td></td>
</tr>
</tbody>
</table>

Standardization: According to Dalton et al (1980), standardization refers to the extent to which clearly articulated procedures and rules are laid down for each jobs. This study adopted items measures from Ferrell and Skinner (1988) and Ghoshal and Nohria (1989). And the detailed item measures are listed in Table 4.5.
Table 4.5: Standardization Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If a written rule does not cover some situation, then we make up informal</td>
<td>Ferrel &amp; Skinner (1988)</td>
</tr>
<tr>
<td></td>
<td>rules for doing things as we go along.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>There are many operational aspects of our business that are not directly</td>
<td>Ferrel &amp; Skinner (1988)</td>
</tr>
<tr>
<td></td>
<td>covered by some formal rule or procedure.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Our company has a strong culture of doing everything by the book.</td>
<td>Ghoshal &amp; Nohria (1989)</td>
</tr>
<tr>
<td>4</td>
<td>Rules and procedures are typically presented in a very formal and documented</td>
<td>Ghoshal &amp; Nohria (1989)</td>
</tr>
<tr>
<td></td>
<td>manner.</td>
<td></td>
</tr>
</tbody>
</table>

**Horizontal Integration**: Coordination means integrating or linking together different parts of an organization to accomplish a collective set of tasks (Van de Ven and Delbecq 1976). Horizontal Integration is defined as the process of linking together different parts of an organization to accomplish tasks collectively. Thus horizontal integration is one of the critical defining characteristics of organizational structure. Its importance has however, previously been underestimated probably because of the dominance of bureaucratic structures that have emphasized the importance of vertical communications. Consequently, few studies have investigated this important concept. However, some recent studies have started to explore horizontal integration, and the constructs from Parente et al (2002) and Englehardt and Simmons (2002) were adopted for this study [See Table 4.6].

Table 4.6: Horizontal Integration Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Our staffs are comfortable to directly communicate with colleagues from</td>
<td>Parente et al (2002)</td>
</tr>
<tr>
<td></td>
<td>different functional areas.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>There are very strong boundaries between each functional area.</td>
<td>Englehardt &amp; Simmons (2002)</td>
</tr>
<tr>
<td>3</td>
<td>People from different departments typically share very similar objectives.</td>
<td>Parente et al (2002)</td>
</tr>
<tr>
<td>4</td>
<td>When people from different functional areas get together, the atmosphere</td>
<td>Parente et al (2002)</td>
</tr>
<tr>
<td></td>
<td>is typically very tense.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The maintenance of informal communication channels between departments is</td>
<td>Bartlett and Ghoshal (1997)</td>
</tr>
<tr>
<td></td>
<td>a high priority within our organization.</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4—Research Methodology

The ERP Adoption Construct

Two individual constructs were developed to measure ERP adoption. The first seeks to measure the scale of the ERP deployment in organization, whilst the other attempts to measure the benefits gained from the ERP adoption. These two constructs are used to test how strategy will direct the arrangement of ERP and how ERP arrangements and benefits might influence organizational structure and flexibility.

ERP Scale: The scale of ERP is mainly used to measure the size, scope and reach of an ERP implementation within the organization studied. The detailed item measures for this construct are presented in Table 4.7.

Table 4.7: ERP Scale Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Our ERP implementation comprises a small number of functional modules, rather than a complete enterprise-wide system.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Most of our computers / work stations are connected to the ERP system.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Access to information from the ERP system is strictly restricted to a limited numbers of users with appropriate authorization.</td>
<td>Markus &amp; Tanis (1999)</td>
</tr>
<tr>
<td>4</td>
<td>A large proportion of our staff uses the ERP system on a daily basis.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The ERP system supports the vast majority of our organization’s functional areas.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Our ERP system has been significantly customized to meet organizational requirements.</td>
<td></td>
</tr>
</tbody>
</table>

ERP Benefits: The benefits to be realized from an ERP implementation are another aspect of ERP adoption, which needed to be addressed, in order to better understand the relationship between ERP and organizational structure. To this end, fifteen specific item measures were developed, as presented in Table 4.8.
### Table 4.8: ERP Benefit Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The adoption of ERP has greatly improved the quality of communication within our organization.</td>
<td>Umble et al (2003)</td>
</tr>
<tr>
<td>2</td>
<td>The adoption of ERP has supported business innovations.</td>
<td>Booth et al (2000)</td>
</tr>
<tr>
<td>3</td>
<td>The adoption of ERP has significantly improved the quality and availability of information for decision making.</td>
<td>Al-Marshali et al (2002)</td>
</tr>
<tr>
<td>4</td>
<td>The adoption of ERP has enhanced our ability to develop business alliances and external linkages.</td>
<td>Tam et al (2002)</td>
</tr>
<tr>
<td>5</td>
<td>ERP utilization has facilitated significant cost reductions within our business.</td>
<td>Chandra &amp; Kumar (2000)</td>
</tr>
<tr>
<td>6</td>
<td>The use of ERP has improved our ability to monitor the performance of staff and business processes.</td>
<td>Umble et al (2003)</td>
</tr>
<tr>
<td>7</td>
<td>The adoption of ERP has greatly decreased the costs of our IT.</td>
<td>Callaway (1999)</td>
</tr>
<tr>
<td>8</td>
<td>ERP adoption has improved the integration of our business/ processes</td>
<td>Callaway (1999)</td>
</tr>
<tr>
<td>9</td>
<td>The adoption of ERP has delivered improved enterprise-wide decision support facilities.</td>
<td>Al-Marshali et al (2002)</td>
</tr>
<tr>
<td>10</td>
<td>ERP utilization has increased our ability to respond to customers effectively.</td>
<td>Callaway (1999)</td>
</tr>
<tr>
<td>11</td>
<td>Adoption of ERP has provided us with a more versatile means of communication.</td>
<td>Markus and Tanis (2000)</td>
</tr>
<tr>
<td>12</td>
<td>The adoption of ERP has improved the productivity/ efficiency of our business processes.</td>
<td>Callaway (1999)</td>
</tr>
<tr>
<td>13</td>
<td>ERP utilization has reduced bottlenecks and facilitated cycle-time reductions.</td>
<td>Bendoly and Kaefer (2004)</td>
</tr>
<tr>
<td>14</td>
<td>The adoption of ERP has allowed us to more effectively differentiate our products and services.</td>
<td>Agarwal et al (2000)</td>
</tr>
<tr>
<td>15</td>
<td>The adoption of ERP has significantly increased our IT infrastructure capability.</td>
<td>Callaway (1999)</td>
</tr>
</tbody>
</table>

### Organizational Flexibility Construct

Flexibility refers to a firm's ability to successfully accommodate changing conditions and to exploit new opportunities in a timely fashion, without incurring too much cost (Bowersox and Daugherty 1995). The items of this construct were based upon previous studies by D'Souza and Williams (2000), Boyer and Lewis (2002), and Boyer (1998), as presented in Table 4.9.
Chapter 4—Research Methodology

Table 4.9: Flexibility Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We can quickly adjust the capacity/volume of our production processes, when needed.</td>
<td>Boyer (1998); Boyer and Lewis (2002)</td>
</tr>
<tr>
<td>2</td>
<td>Our company can, if necessary, introduce a wide variety of product features.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>We typically find it difficult to adjust our product mix, to suit the changing requirements of the market.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Our organization often experiences difficulties when adjusting its standard production processes.</td>
<td>D'Souza and Williams (2000)</td>
</tr>
<tr>
<td>5</td>
<td>Where necessary, we can restructure our organization, in a relatively short period of time, without incurring too much extra cost.</td>
<td></td>
</tr>
</tbody>
</table>

Organizational Characteristics

In addition to above research context, organizational characteristics such as organizational size, ownership and the sector that respondent company is situated in have also been questioned in the questionnaire [Refer to Table 4.10].

Organizational size: this indicates how many staff are employed by the target company. By this way, this study can find out whether or not the sample is biased.

Organizational Ownership: is to indicate the ownership of the target company. In China, there are at least three different types of ownership, namely State Owned Company (SOEs), Foreign Owned Enterprise (FOEs) and Private Ventures (PVs). By adopting this measure, this study is able to identify the possible differences of the ERP adoption for these three kinds of ownership.

Business Sector: is to indicate the industry sector that the respondent company is situated in. By so doing, this study can find out whether or not the sample is biased.
Table 4.10: Organizational Characteristics Measures

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Q1 Which of the following categories best describes the manufacturing sector in which your company operates. □ Food, tobacco and drinks □ Electrical and electronic products □ Chemicals and related products □ Wood and wood-based products □ Textile, clothes, leather and Luggage □ Pulp, paper and related □ Machinery &amp; Equipment □ Other (please specify below):</td>
</tr>
<tr>
<td>02</td>
<td>Q2 Which of the following categories best describes your ownership □ State Owned Company □ Foreign Owned Company □ Private Owned Company</td>
</tr>
<tr>
<td>03</td>
<td>Q3 Approximately how many personnel does your company currently employ?</td>
</tr>
</tbody>
</table>

4.4.2 Questionnaire Validation

Though quantitative methods offer powerful statistical advantages, their design and operationization demand strict validation. A questionnaire should be designed in such a way that it is able to generate a high response rate in order to carry out valid statistic analyses (Moser and Kalton 1971; Creswell 1994). Thus, these twin objectives were set for the questionnaire design, namely the ability to generate a high response rate, and a high level of design validation, to ensure the integrity of the ensuing results. In view of this, a variety of techniques were employed to help ensure that the design of the finished questionnaire was of the highest integrity.

For example, the questionnaire adopted constructs and item measures directly from past studies, whenever possible (Churchill 1979). For example, the centralization construct were directly drawn from the quantitative study of Hage and Aiken (1967). By so doing, response rate and validity of each construct can be better guaranteed and this can also allow this study's finding to be objectively compared with prior IT studies (Churchill 1979).
Pre-testing, which aims to locate and correct weaknesses in the questionnaire, was also used to provide further reassurance of the quality of the questionnaire design. As argued by different authors (Sekaran, 1992; Churchill 1995), pre-testing provides an important means to refine the questionnaire and to identify any potential errors or weaknesses. In so doing, it provides an inexpensive insurance for the researcher (Churchill 1995). In catering for the fact that data should be collected in China, pre-tests were carried out in two stages. In the first stage, questionnaires were pre-tested by the academics and research students at Loughborough University. This stage resulted in a number of significant changes to the questionnaire format and wording. More specifically, changes were made to the number of pages of the questionnaires, the font size, the border and shading of the table. Moreover, the introduction page of the questionnaire was changed in order to provide the respondent with a more concise and professional appearance. Finally, the wording of the questionnaire was significantly enhanced to ensure that the meaning of each item measure was clear, straightforward and without any potential misinterpretation. Following this, the English version questionnaire was translated into Chinese and validated by 'Back translation' (Luo and Peng 1999) in order to avoid the distortion of the meaning. The translated questionnaire was further pre-tested by five Chinese managers for the reason that it is necessary to evaluate how the translated questionnaire was understood and to check whether the questionnaire content was appropriate to the potential respondent (Churchill 1979). For example, at this stage the pre-testing highlighted a problem with the word 'Strategy', which some respondents thought might require the disclosure of sensitive information. So in order to address this issue, the term 'Strategy' was replaced with the term 'Corporate Values' in the questionnaire. In addition, the wording and tone of the Chinese version was continuously changed in order to provide the respondents feeling of being respected and that this questionnaire is a genuine academic research.

Having successfully pre-tested the survey, a 'pilot test' (Easterby-Smith et al 1991) - that is a dry run of the entire research process - was carried out in China. A total of 100 questionnaires were mailed out, and 12 completed questionnaires were returned; a response rate of 12%. Since this response rate was thought to be acceptable, it was decided to carry out the main survey without further modifying the questionnaire.
4.4.3 The Sampling Framework and Process

Sampling is defined by Sekaran (1992: p226-227) as the "process of selecting a sufficient number of elements from the population so that in studying the sample, and understanding the properties or characteristics of the sample subjects, we will be able to generalize the properties or the characteristics of the population elements."

To this end, a three step sampling process was adopted for this study.

The first step involved defining the population (Churchill 1995). The chosen population for this study included all manufacturing companies in China that might have adopted ERP technology. The reason to choose manufacturing companies is due to the fact that ERP system was originally developed for manufacturing companies, although after many years' development it is now being adopted by non-manufacturing companies (Chung and Snyder 2000). Furthermore, since the questionnaire sought to address questions relating to organizational structure, strategy and ERP, senior managers, such as CEOs or General Managers, were targeted, as they were perceived to be best able to respond to such questions. Moreover, since ERP systems are related closely with manufacturing companies and there are significant structural differences between different industries (Aldrich 1999), only manufacturing companies were ultimately targeted.

After selecting the target population, the second stage was to identify the sample frame. It must be pointed out that at the time of data collection, the number of companies in China that had adopted ERP was fairly limited (Kumar and Van Hillegersberg 2000). Furthermore, due to commercial sensitivity, the contacted ERP vendors refused to provide any lists of companies that have adopted ERP. Consequently, the only approach to identifying companies that had adopted ERP was by web searching. That is, the researcher firstly searched the internet through the 'Google' and 'Baidu' searching engines and found the relevant web pages that clearly stated the names of the companies that have adopted ERP systems. For example, in China the ERP adopters will commonly recruit staff with past experiences of ERP system such as SAP. And at the same time, the ERP vendors and news papers will also report the adoption of ERP of specific company, for the purpose of publicity. These companies were then compiled using Excel and in total, this web searching strategy identified 780 companies that had already adopted ERP in China. Buchanan et al (1988: p54) suggested that 'in the conflict between

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3. www.baidu.com, A search engine that was developed by Chinese and is popular in China
desirable and the possible, the possible always wins". Therefore, though it is desirable to strictly define the criteria, such as size of organization, by which the sample would be chosen accordingly, this research had to compromise and select all the identifiable manufacturing companies that had adopted ERP as the initial target sample.

The third stage was to define the sample size. As mentioned above, there were not many companies in China that have adopted ERP when the data collection began, all identifiable manufacturing companies that have adopted ERP were chosen. The addresses of those companies were identified through the use of a CD-based commercial company list. However, since an explicit aim of this study was to compare the structural differences between the companies with ERP and those without ERP, a further 420 manufacturing companies were chosen randomly from the database, the expectation was that most of these companies would not have ERP.

Before ending this part, it is must be mentioned that since this study is not a random sampling study, it was envisaged that sampling errors that result from surveying only some, but not all, elements of the survey population (Dillman 2000) might occur. Consequently, it was necessary to also check the respondents for characteristics such as company size and industry in order to see whether or not the final sample was biased.

4.4.4 Management of Questionnaire

The finished questionnaire was ultimately distributed to the senior official of the sampled populations. It had gone through a pretest, and a pilot test. Only after attaining reasonable responses and response rate from the pilot test [12% response rate of the pilot test of this study], was the study ultimately distributed.

During the primary mailing stage, in order to gain a high response rate, telephone calls were made to the targeted companies with the purpose of requesting their cooperation. Excluding the responses from pilot test, 105 valid questionnaires were returned from the primary mailing, 19 of these were from non-ERP adopters. Next, the follow-up questionnaire was used to increase the response rate, which generated another 39 valid responses. In total, one thousand and two hundred questionnaires were distributed inclusive of the pilot test and from these seven
hundred and eighty companies have adopted ERP system. The results of the survey are presented and discussed in Chapters 5 and 6.

4.5 The Aim of the Qualitative Study

As stated above, qualitative methods can supplement and complement quantitative studies. Qualitative methods can be used as a tool to explore the underlying meaning of the social actions, but also to help the researcher to understand the research context. In this study, qualitative methods in the form of interviews, were employed after the quantitative studies had been completed. Since the detailed process of qualitative method design, data collection and data analysis are to be presented in Chapter 7 [Section 7.2], this section sets out only a brief description of the aims of the qualitative research process.

Specifically, the qualitative study was employed to address two issues. First, this phase of the research aimed to facilitate a deeper and richer appreciation of the contextual issues surrounding the investigation, such as the research impact of ERP in organizations; the views of the individual managers that were interviewed and potential reasons for any identified variations in perspective and approach amongst the questionnaire respondents. Second, during analysis of the quantitative data, a number of divergences from the hypotheses were revealed, the qualitative data was then analyzed in order to gain an understanding of the reasons for divergences.

A semi-structured approach to interviewing was selected in order to explore any issues that arose from undertaking the survey and in order to leave space for respondents to expand on some issues (Saunders et al. 2000; Bryman 2006). In the first stage of the research, four interviews were conducted for the purpose of piloting the interview design. Before the second stage, the interview questions were reevaluated and redesigned in order to respond to the general objective of the research [See Appendices III-VI for copies of the English and Chinese versions of the Interviews].

The interviewees selected were senior managers who had a comprehensive understanding of the company's strategy, and daily operations and the ERP system. Due to the difficulties in gaining access to willing interviewees, during the pilot study some non-manufacturing companies were included.
4.6 Summary of the Chapter

In this chapter the methodology of this project was presented. The primary rationale for a mixed methodology is to make the most of the distinct advantages of both the quantitative and qualitative methods and to counteract their disadvantages. The research thus benefits from access to different kinds of data so that better insight into the complexity and special characteristics of social studies has been gained.

A quantitative research method was employed as the main means for testing the research model. These hypotheses were then divided into manageable constructs to create the questionnaire. Qualitative research in the form of interview was used to generate a deeper understanding of the context and also to provide explanation for some divergences generated from the quantitative studies.

In the following chapter, the first element of the research findings is presented through a descriptive analysis of the quantitative data.
Chapter 5—Descriptive Review of Data & Creation of Summated Scales

Chapter 5

Descriptive Review of Data & Creation of Summated Scales
Chapter 5—Description Review of Data & Creation of Summated Scales

5.1 Introduction

The source of data for this provisional quantitative analysis is the data collected through the questionnaire survey conducted between March 2005 and October 2005. During the survey period, a total of 1200 questionnaires were posted to the CEOs, or the general managers, of a sample of manufacturing companies. Ultimately, a total of one hundred and fifty six valid responses were returned from the sample of targeted companies. Of these one hundred and twenty four questionnaires were completed by the senior official of those companies that had already adopted ERP; the rest of them had not as yet adopted ERP. The sample of valid response does not include the five returned for the reason of 'can't find address', and four questionnaires which were not filled in properly. Based upon these figures, it was possible to determine that the response rate of the survey was a respectable thirteen percent.

The strategy, adopted on this study, for the statistical analysis of the data was as follows. Upon completion of the questionnaire survey, all the collected data have been thoroughly analysed using the SPSS statistical analysis package. The first stage of this process sought to develop descriptive profiles of the data, to better understand its key features, before employing data reduction techniques, such as factor analyses and cluster analysis, to generate the summated scales and the strategy typologies. Thereafter, in the second stage [presented in Chapter 6], correlation analyses have been extensively adopted with the purpose of exploring the strengths of the relationship among different sets of organizational factors.

With regard to the data reduction techniques, presented in this Chapter, their primary purpose was to minimise the number of variables that would be included in the correlation analyses, as presented in the following chapter. The main method for reducing the variables, ultimately adopted, was through the creation of 'summated scales'; as recommended by Hair et al (1998), which categorizes similar items into homogeneous groups. Accordingly, the remainder of this Chapter is structured into the following five sections. Section 5.2 presents a descriptive account of the responses, while Section 5.3 details the validity and reliability issues relating to the study. Section 5.4 employs factor analysis, with the aim of grouping similar items into groups. Section 5.5 presents the cluster analysis which groups the cases into two different strategy groups and which will then be used for subsequent quantitative data analysis. Finally, Section 5.6 provides a summary of the whole
5.2 Descriptive Analysis of the Sample

Though desirable in nature, it is impossible to collect information from all members of a large population due to prohibitively high cost and time that it would necessitate (Churchill, 1995). Moreover, it is almost impossible to identify all the manufacturing companies that might have adopted ERP. Due to these difficulties, the sample had to be chosen based on non-random sample: that is the chance of each case being selected from each population is not known (Saunders et al, 1997). As a result, it is unlikely that the sample will be perfectly representative of the target populations. Fortunately, the organization characteristics described in the Tables 5.1, 5.2, 5.3 suggest that the sample includes responses from a wide range of industries, ownership types and organizational sizes, which provides some reassurance as to the representativeness of the sample.

Table 5.1: Responses by Manufacturing Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Food, tobacco and drinks</td>
<td>12</td>
<td>7.7</td>
</tr>
<tr>
<td>2. Textile, clothes, leather and Luggage</td>
<td>13</td>
<td>8.3</td>
</tr>
<tr>
<td>3. Electrical and electronic products</td>
<td>34</td>
<td>21.8</td>
</tr>
<tr>
<td>4. Pulp, paper and related</td>
<td>10</td>
<td>6.4</td>
</tr>
<tr>
<td>5. Chemicals and related products</td>
<td>20</td>
<td>12.8</td>
</tr>
<tr>
<td>6. Machinery &amp; Equipment</td>
<td>32</td>
<td>20.5</td>
</tr>
<tr>
<td>7. Wood and wood-based products</td>
<td>15</td>
<td>9.6</td>
</tr>
<tr>
<td>8. Other</td>
<td>20</td>
<td>12.8</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In total there were eight distinctive manufacturing sectors listed in the questionnaire, the numbers of responses collected from each is highlighted in Table 5.1. As illustrated, the respondents both from electrical and electronic industry, and from the machinery and equipment each account for more than one fifth of the total responses. By comparison, the respondents from the first two industries are each
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less than the ten percent of the total responses. One possible interpretation of why this distribution between sectors, is slightly uneven is that there was more interest in ERP adoption amongst the high tech organizations and therefore those generated more responses.

As mentioned in the Chapter two, though the Chinese economy is currently dominated by PVs in some provinces, the SOEs are still numerous and exert a powerful influence. Accordingly, three ownership types which cover the SOEs, PVs, and FOEs, were listed in the questionnaire. The case summary grouped by the ownership type is illustrated in Table 5.2, shows that a largest proportion of the responses are from the SOEs (47.4%). Moreover, the SOEs account for 53% of the ERP adopters, which partly confirms the work of He (2004), who found that SOEs were more likely to adopt ERP compared with PVs.

Table 5.2: Responses by Ownership Category

<table>
<thead>
<tr>
<th>Ownership Category</th>
<th>ERP Adopter</th>
<th>Non-ERP Adopter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>Perc. (%)</td>
<td>Freq.</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Owned Enterprises</td>
<td>29</td>
<td>23.4</td>
<td>6</td>
</tr>
<tr>
<td>Private Ventures</td>
<td>26</td>
<td>21.0</td>
<td>18</td>
</tr>
<tr>
<td>State Owned Enterprises</td>
<td>66</td>
<td>53.2</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>97.6</td>
<td>32</td>
</tr>
<tr>
<td>Missing System</td>
<td>3</td>
<td>2.4</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>100.0</td>
<td>32</td>
</tr>
</tbody>
</table>

Finally, a summary of the responses grouped by number of employees, is presented in Table 5.3. It can be seen that the most common class of respondent is those from organizations with a size ranging from three thousand to four thousand. In total, the respondents with an employee size ranging from three thousand to four thousand account for 27.6 percent of the total responses. By comparison, small organizations, with fewer than eight hundred employees, account for only 14.1 percent of the sample. However, it is possible to find significant numbers of responses in all six size classes, which suggests that is unlikely that the sample is biased towards a single type of organization.
Table 5.3: Employment Size of Cases

<table>
<thead>
<tr>
<th>Employee Size</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-800</td>
<td>22</td>
<td>14.1</td>
</tr>
<tr>
<td>800-2000</td>
<td>19</td>
<td>12.2</td>
</tr>
<tr>
<td>2000-3000</td>
<td>27</td>
<td>17.3</td>
</tr>
<tr>
<td>3000-4000</td>
<td>43</td>
<td>27.6</td>
</tr>
<tr>
<td>4000-5000</td>
<td>25</td>
<td>16.0</td>
</tr>
<tr>
<td>&gt;5000</td>
<td>20</td>
<td>12.8</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Having described the general characteristics of the responding organizations, it is important to conduct a thorough descriptive analysis of the remaining item measures, each of which is associated with one of the study's research constructs [See Table 5.4-5.11]. The remainder of this section will attempt to describe the variables in the questionnaire.

5.2.1 Descriptive Profile of Structural Variables

As illustrated in Table 5.4, the organizational configuration construct is composed of four distinct item measures. The respondents were asked to indicate the extent to which they agree with the statements relating to their organizational configuration, ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). It is interesting to note that the average of item one [Con1] is largest while item three [Con3] is the smallest one. These two items indicate that most of the majority of respondents tended to agree that their companies were heavily layered ones. At the same time, item two [Con2] shows that the horizontal spans of control of these responding companies are wide, since over 50 percent respondents choose five, or more.
Table 5.4: Description of Configuration Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Con1</td>
<td>Our organization has a very strong hierarchical structure, with many layers between the most senior and most junior employees.</td>
<td>5.3</td>
<td>Freq. 3 5 17 20 28 39 44</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc. 1.9 3.2 11 13 18 25 28</td>
<td></td>
</tr>
<tr>
<td>Con2</td>
<td>Each manager has a very large number of subordinates reporting directly to them.</td>
<td>4.5</td>
<td>Freq. 12 12 20 30 31 29 21</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc. 7.7 7.7 13 19 20 19 14</td>
<td></td>
</tr>
<tr>
<td>Con3</td>
<td>The structure of our organization is very flat.</td>
<td>3.6</td>
<td>Freq. 31 17 21 27 41 14 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc. 20 11 14 17 28 9 2.6</td>
<td></td>
</tr>
<tr>
<td>Con4</td>
<td>We try to minimize the number of subordinates reporting to any one manager.</td>
<td>4.0</td>
<td>Freq. 23 15 17 35 32 22 11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc. 15 9.7 11 23 21 14 7.1</td>
<td></td>
</tr>
</tbody>
</table>

A descriptive analysis of the centralization variables has been presented in Table 5.5. Around sixty percent respondents selected six and seven for item one [Cen1], of the centralization construct, and around seventy five percent selected six and seven for item two [Cen2]. Together these results show that in these sampled companies staff empowerment was very limited. In a similar vein, a high percentage of the respondents can be seen to disagree with the statements in item four [Cen4], which suggest that those sampled companies enjoy limited empowerment. However, it is interesting to note that from the lower score for item three [Cen3], indicates that respondents didn't generally feel that minor issues have to be referred higher on the command chain.
### Table 5.5: Description of Centralization variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>StrONGLY DISAGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cen1</td>
<td>There can be little action taken in our organization until a supervisor approves the decision.</td>
<td>5.6</td>
<td>Freq.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.9</td>
</tr>
<tr>
<td>Cen2</td>
<td>Any employee wanting to make their own decisions would be quickly discouraged.</td>
<td>5.2</td>
<td>Freq.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.3</td>
</tr>
<tr>
<td>Cen3</td>
<td>Even relatively minor issues have to be referred to someone higher up for a final decision.</td>
<td>3.6</td>
<td>Freq.</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>15</td>
</tr>
<tr>
<td>Cen4</td>
<td>Our employees generally feel empowered to take responsibility for making their own decisions.</td>
<td>3.6</td>
<td>Freq.</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>15</td>
</tr>
</tbody>
</table>

The choices of the respondents show that most of their companies adopt a fairly standardized and formalized organizational structure. As illustrated by Table 5.6, items one [Sta1], three [Sta3] and four [Sta4] in this construct, which measures the degree to which organizational working practices are standardized, average to be greater than 5, and at least forty five percent of respondents have chosen either six or seven for these three items. In addition, item two [Sta2], which is used to measure the extent to which management practices are not covered by the formal rules and regulations, averages 3.7, which suggests that in the respondents' opinion the majority of organizational practices are covered by formal rules and regulations. This then provides further support that respondents perceive their organizations to be highly standardized.
### Table 5.6: Description of Standardization

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Sta1</td>
<td>If a written rule does not cover some situation, then we make up informal rules for doing things as we go along.</td>
<td>5.1</td>
<td>Freq. 6 10 5 22 39 47 27</td>
<td>Perc. 3.9 6.4 3.2 14 25 30 17</td>
</tr>
<tr>
<td>Sta2</td>
<td>There are many operational aspects of our business that are not directly covered by some formal rule or procedure.</td>
<td>3.7</td>
<td>Freq. 26 25 24 22 22 21 16</td>
<td>Perc. 17 16 15 14 14 14 10</td>
</tr>
<tr>
<td>Sta3</td>
<td>Our company has a strong culture of doing everything by the book.</td>
<td>5.2</td>
<td>Freq. 4 7 16 19 35 39 36</td>
<td>Perc. 2.6 4.5 10 12 22 25 23</td>
</tr>
<tr>
<td>Sta4</td>
<td>Rules and procedures are typically presented in a very formal and documented manner.</td>
<td>5.4</td>
<td>Freq. 6 6 12 17 34 34 46</td>
<td>Perc. 3.9 3.9 7.7 11 22 22 30</td>
</tr>
</tbody>
</table>

As to the strength of the horizontal integration, the quantitative data, as illustrated in Table 5.7, shows that the means of items one [H11] and three [H13] score highest which points out most of respondents agreed that employees generally feel comfortable in their interaction with staff from other departments and that they share the same objectives. The low scores for the means of items two [H12] and four [H14] further confirm that interdepartmental relationships are perceived to be less tense and generally not impeded by functional boundaries. Thus in total, the descriptive analysis suggests that most respondents' organizations enjoy effective interdepartmental integration and organizational staff are able to work easily with their colleagues from other departments. Item five [H15] scored at 4.7 and this suggests that a slightly more responding companies care much about the information communication channel across departments.
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Table 5.7: Description of Horizontal Integration Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>HR1</td>
<td>Our staffs are comfortable to directly communicate with colleagues from different functional areas.</td>
<td>5.2</td>
<td>10 6 9 17 32 41 41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.4 3.8 5.8 11 21 26 26</td>
<td></td>
</tr>
<tr>
<td>HR2</td>
<td>There are very strong boundaries between each functional area.</td>
<td>3.8</td>
<td>20 25 24 29 23 16 18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13 16 15 19 15 10 12</td>
<td></td>
</tr>
<tr>
<td>HR3</td>
<td>People from different departments typically share very similar objectives.</td>
<td>5.2</td>
<td>5 7 9 23 33 47 32</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.2 4.5 5.8 15 21 30 21</td>
<td></td>
</tr>
<tr>
<td>HR4</td>
<td>When people from different functional areas get together, the atmosphere is typically very tense.</td>
<td>2.5</td>
<td>49 49 18 20 9 8 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31 31 12 13 5.8 5.1 1.9</td>
<td></td>
</tr>
<tr>
<td>HR5</td>
<td>The maintenance of informal communication channels between departments is a high priority within our organization.</td>
<td>4.7</td>
<td>13 9 13 28 40 24 28</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.4 5.8 8.4 18 26 15 18</td>
<td></td>
</tr>
</tbody>
</table>

5.2.2 Descriptive Profile of Flexibility Variables

As illustrated by Table 5.8, a large percentage of respondents are shown to be confident that their organizations can respond flexibly to any changes to production capacity [Fle1], for which fifty nine percent of respondents selected six or seven and the average is 5.5. Similarly, a large proportion of them are confident with their organizations ability to introduce new product features [Fle2]. By contrast, the average for item five [Fle5], that describes the capability in changing organizational structure, only scored at 3.8. Finally, the average score for item three [Fle3] and item four [Fle4] were both positioned towards the middle of the scale, which indicated that companies weren’t generally confident with their ability to change their production processes or product mix.
Table 5.8: Description of Flexibility Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Flx1</td>
<td>We can quickly adjust the capacity / volume of our production processes, when needed.</td>
<td>5.5</td>
<td>Freq.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>4.5</td>
</tr>
<tr>
<td>Flx2</td>
<td>Our company can, if necessary, introduce a wide variety of product features.</td>
<td>4.9</td>
<td>Freq.</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>9.6</td>
</tr>
<tr>
<td>Flx3</td>
<td>We typically find it difficult to adjust our product mix, to suit the changing requirements of the market.</td>
<td>4</td>
<td>Freq.</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>7.7</td>
</tr>
<tr>
<td>Flx4</td>
<td>Our organization often experiences difficulties when adjusting its standard production processes.</td>
<td>4.2</td>
<td>Freq.</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>7.7</td>
</tr>
<tr>
<td>Flx5</td>
<td>Where necessary, we can restructure our organization, in a relatively short period of time, without incurring too much extra cost.</td>
<td>3.8</td>
<td>Freq.</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>15</td>
</tr>
</tbody>
</table>

5.2.3 Descriptive Profiles of Strategy Variables

The organizational strategy construct is composed of six distinct item measures [See Table 5.9]. The respondents were asked to indicate the extent to which they agree with the statements relating to their strategy, ranging from 1, strongly disagree to 7, strongly agree. As illustrated, the means of the strategy variables are higher than the mid point for the scale. For the six items, at least forty percent of respondents select six or seven for each of the item. Furthermore, the last two items [Str5, Str6] are scored higher than the other four, which shows that most of respondents agreed that their organizations were generally keen to exploit the new opportunities and new technologies. For these two items, more than fifty percent of respondents selected either six or seven. This might suggest that the majority of responding companies are proactive in absorbing emerged new ideas and technology.
Table 5.9: Description of Strategy Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Str1</td>
<td>Our strategy is based upon the quality, rather than the price, of our products</td>
<td>5</td>
<td>Freq.</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>5.1</td>
</tr>
<tr>
<td>Str2</td>
<td>We typically compete by introducing new products ahead of others, rather than by improving existing products.</td>
<td>4.9</td>
<td>Freq.</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>7.1</td>
</tr>
<tr>
<td>Str3</td>
<td>Our strategy is based upon the production and promotion of a wide range of products</td>
<td>4.6</td>
<td>Freq.</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>9.6</td>
</tr>
<tr>
<td>Str4</td>
<td>We compete by expanding into new markets, rather than by focusing upon existing ones</td>
<td>4.6</td>
<td>Freq.</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>8.3</td>
</tr>
<tr>
<td>Str5</td>
<td>We always try to respond rapidly to new ideas from the environment</td>
<td>5.4</td>
<td>Freq.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>2.6</td>
</tr>
<tr>
<td>Str6</td>
<td>We always seek to adopt the latest forms of technology, at the earliest opportunity.</td>
<td>5.4</td>
<td>Freq.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.9</td>
</tr>
</tbody>
</table>

5.2.4 Descriptive Profiles of ERP Variables

In Table 5.10, the ERP scale variables that measure the extent to which ERP has been adopted, and diffused through organizations, are described and consequently the table represents only the cases in which ERP has been adopted by a respondent company. It can be seen that most of respondents agreed that ERP system was strictly controlled through authorization [Sca3], the average of the score being 6.3. At the same time, the summary also disclosed another important fact, namely that most of the respondents agreed that their ERP packages were widely distributed across their company’s IT infrastructure. As to the item with the lowest score, it was the ‘extent of ERP customization’ [Sca6], a large proportion of the respondents tended to select fours and fives. This suggests that their ERP projects are generally, but not significantly, customized.
### Table 5.10: Descriptions of ERP Scale Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Sca1</td>
<td>Our ERP implementation comprises a small number of functional modules, rather than a complete enterprise-wide system.</td>
<td>4.9</td>
<td>16 10 5 10 21 22 38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13 8.2 4.1 8.2 17 18 31</td>
<td></td>
</tr>
<tr>
<td>Sca2</td>
<td>Most of our computers / work stations are connected to the ERP system.</td>
<td>5</td>
<td>8 9 7 15 29 26 30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.5 7.3 5.7 12 23 21 24</td>
<td></td>
</tr>
<tr>
<td>Sca3</td>
<td>Access to information from the ERP system is strictly restricted to a limited numbers of users with appropriate authorization.</td>
<td>6.3</td>
<td>2 1 2 3 10 28 78</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.6 0.8 1.6 2.4 8.1 23 63</td>
<td></td>
</tr>
<tr>
<td>Sca4</td>
<td>A large proportion of our staff use the ERP system on a daily basis.</td>
<td>4.6</td>
<td>11 13 13 17 19 25 25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.9 11 11 14 15 20 20</td>
<td></td>
</tr>
<tr>
<td>Sca5</td>
<td>The ERP system supports the vast majority of our organization's functional areas.</td>
<td>4.9</td>
<td>5 9 11 21 27 28 23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 7.3 8.9 17 22 23 19</td>
<td></td>
</tr>
<tr>
<td>Sca6</td>
<td>Our ERP system has been significantly customized to meet organizational requirements.</td>
<td>4.5</td>
<td>13 6 9 31 28 21 16</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11 4.8 7.3 25 23 17 13</td>
<td></td>
</tr>
</tbody>
</table>

The benefits to be derived from ERP implementation were measured through fifteen distinct items, and the respondents were asked to indicate the extent to which they agreed that each ERP benefit had been realized, using a scale that ranged from 7 [strongly agree], to 1 [strongly disagree]. As illustrated in Table 5.11, most of the ERP adopters agreed that the adoption of ERP brought them a significant range of benefits relating to the provision of information and communication. Among them, communications within organizations [Ben1] is found to be significantly improved through the adoption of ERP. Moreover, most of the respondents agreed that the adoption of ERP resulted in improvements to their IT infrastructure capability. However, it seems that the adoption of ERP didn’t significantly reduce the cost of IT, within their organizations [Ben7].

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### Table 5.11: Description of ERP Benefits Variables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mean</th>
<th>Strong Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ben1</td>
<td>The adoption of ERP has greatly improved the quality of communication within our organization.</td>
<td>5.7</td>
<td>Freq.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>0.8</td>
</tr>
<tr>
<td>Ben2</td>
<td>Supported the development of business innovations.</td>
<td>5.2</td>
<td>Freq.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>3.2</td>
</tr>
<tr>
<td>Ben3</td>
<td>The adoption of ERP has significantly improved the quality and availability of information for decision making.</td>
<td>5.5</td>
<td>Freq.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.3</td>
</tr>
<tr>
<td>Ben4</td>
<td>The adoption of ERP has enhanced our ability to develop business alliances and external linkages.</td>
<td>4.8</td>
<td>Freq.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>2.6</td>
</tr>
<tr>
<td>Ben5</td>
<td>ERP utilization has facilitated significant cost reductions within our business.</td>
<td>4.9</td>
<td>Freq.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>2.6</td>
</tr>
<tr>
<td>Ben6</td>
<td>The use of ERP has improved our ability to monitor the performance of staff and business processes.</td>
<td>5.3</td>
<td>Freq.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>0.6</td>
</tr>
<tr>
<td>Ben7</td>
<td>The adoption of ERP has greatly decreased the costs of our Information Technology.</td>
<td>4.7</td>
<td>Freq.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>4.5</td>
</tr>
<tr>
<td>Ben8</td>
<td>ERP adoption has improved the integration of our business/ processes</td>
<td>5.3</td>
<td>Freq.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.3</td>
</tr>
<tr>
<td>Ben9</td>
<td>The adoption of ERP has delivered improved enterprise-wide decision support facilities.</td>
<td>5.3</td>
<td>Freq.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>3.2</td>
</tr>
<tr>
<td>Ben10</td>
<td>ERP utilization has increased our ability to respond to customers effectively.</td>
<td>5.1</td>
<td>Freq.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>3.2</td>
</tr>
<tr>
<td>Ben11</td>
<td>The adoption of ERP has provided us with a more versatile means of communication.</td>
<td>5.3</td>
<td>Freq.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.9</td>
</tr>
<tr>
<td>Ben12</td>
<td>The adoption of ERP has improved the productivity/efficiency of our business processes.</td>
<td>5.3</td>
<td>Freq.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>2.6</td>
</tr>
<tr>
<td>Ben13</td>
<td>ERP utilization has reduced bottlenecks and facilitated cycle-time reductions.</td>
<td>5.1</td>
<td>Freq.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>1.9</td>
</tr>
<tr>
<td>Ben14</td>
<td>The adoption of ERP has allowed us to more effectively differentiate our products and services.</td>
<td>5</td>
<td>Freq.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>5.7</td>
</tr>
<tr>
<td>Ben15</td>
<td>The adoption of ERP has significantly increased our IT infrastructure capability.</td>
<td>5.5</td>
<td>Freq.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perc.</td>
<td>0.8</td>
</tr>
</tbody>
</table>
5.3 Reliability and Validity

It has been consistently argued that rigor is a very necessary and highly desirable, if not essential, feature of research in the area of information system (Benbasat and Zmud 1999; Davenport and Markus 1999). This section aims to discuss two key aspects of rigor, namely the reliability and validity of the research [Refer to Table 5.12], which will then be used to inform the data analysis in the following sections.

The concepts of reliability and validity are, to some extent, linked with each other. While reliability mainly measures the extent to which a measuring procedure yields the same result on the repeated trial, the validity is to measure the degree to which the concepts that are measured are similar to the ones that are to be measured (Easterby-Smith et al. 1991; Creswell 1994; Drucker-Godard et al. 2001). Reliability is an important indicator of the generalization power of a study (Easterby-Smith et al. 1991; Hollis 1994).

Generally speaking the commonly mentioned reliability measures include internal consistency and inter-rater reliability (Hair et al. 1998; Sekaran 2000; Drucker-Godard et al. 2001). The internal consistency is used to judge the consistency of results across items on the same test. Essentially, it is used to ensure that test item measure the same underlying construct (Drucker-Godard et al. 2001). Internal consistency (Popper 1972a) is the extent to which tests or procedures assess the same characteristic, skill or quality. It is a measure of the precision between the observers or of the measuring instruments used in a study. This type of reliability often helps researchers interpret data and predict the value of scores and the limits of the relationship among variables. Inter-rater reliability is the extent to which two or more individuals (coders or raters) agree (Sekaran 1992). Inter-rater reliability addresses the consistency of the implementation of a rating system (Sekaran 1992).

While reliability is concerned with the accuracy of the actual measuring instrument or procedure, validity is concerned with the study's success at measuring what the researcher set out to measure. And indeed, validity can be further divided into four different types comprising face validity, criterion related validity, construct validity and content validity (Bailey 1994). Face validity is concerned with how a measure or procedure appears (Bailey 1994; Hair et al. 1998). Unlike content validity, face validity does not depend on established theories for support (Fink, 1995). Criterion
related validity, also referred to as instrumental validity, is used to demonstrate the accuracy of a measure or procedure by comparing it with another measure or procedure which has been demonstrated to be valid. Construct validity seeks agreement between a theoretical concept and a specific measuring device or procedure (Drucker-Godard et al. 2001). To understand whether a piece of research has construct validity, three steps should be followed. First, the theoretical relationships must be specified. Second, the empirical relationships between the measures of the concepts must be examined. Third, the empirical evidence must be interpreted in terms of how it clarifies the construct validity of the particular measure being tested (Carmines & Zeller 1991). Content Validity is based on the extent to which a measurement reflects the specific intended domain of content (Carmines & Zeller 1991). Content validity concerns the extent to which a measure adequately represents all facets of a concept. Although the establishment of content validity seems relatively straightforward, the process becomes more complex as it moves into the more abstract domain of socio-cultural studies. For socio-cultural studies, content validity forces the researchers to define the very domains they are attempting to study. To apply these concepts to social research, it is desirable to use measurement tools that are both reliable and valid. Having introduced the key facets of these types of validity and reliability, in the above paragraphs, Table 5.12 provides a summary view of the validity and reliability.

Table 5.12: Validity and Reliability: Key

<table>
<thead>
<tr>
<th>Validity and Reliability Type</th>
<th>Description</th>
<th>Planned Approach</th>
<th>Acted Approach</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Consistency</td>
<td>Consistency of results across items on same test</td>
<td>Cronbach Alpha Correlation Test</td>
<td>Cronbach Alpha Correlation Test</td>
<td>Drucker-Godard et al. 2001</td>
</tr>
<tr>
<td>Inter-rater Reliability</td>
<td>Extent to which two or more individuals agree</td>
<td>Pretest</td>
<td>Pretest</td>
<td>Sekaran 1992</td>
</tr>
<tr>
<td>Face Validity</td>
<td>Concerned with how a measure appears</td>
<td>Pretest</td>
<td>Pretest</td>
<td>Bailey 1994</td>
</tr>
<tr>
<td>Criteria-related Validity</td>
<td>Accuracy of a measure by comparing it with another measure</td>
<td>Past works as appropriate</td>
<td>Past works as appropriate</td>
<td>Bailey 1994</td>
</tr>
<tr>
<td>Construct Validity</td>
<td>Agreement between a theoretical concept and a specific measuring device or procedure</td>
<td>Past works as appropriate</td>
<td>Past works as appropriate</td>
<td>Drucker-Godard et al. 2001</td>
</tr>
<tr>
<td>Content Validity</td>
<td>Extent to which a measurement reflects the specific intended domain of content</td>
<td>Pretest</td>
<td>Pretest</td>
<td>Carmines &amp; Zeller 1991</td>
</tr>
</tbody>
</table>
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In terms of this study, the concepts of reliability and validity are closely linked with one another. While the inter rater reliability of the different constructs in this study was tested through pretests, after which the questionnaire was tidied up, the internal consistency was tested through correlation tables (Sekaran 1992). Moreover, the pretest interviewees were designated to help in the evaluation of the face validity. As far as the construct validity is concerned, the relationship or association between variables that were tested by previous studies will be studied wherever appropriate. For example, relationship between organizational size and structural dimensions could be used to test the construct validity due to their inherent and proven association (Pugh et al. 1968; Child 1969). Meanwhile the KMO Test will be conducted to check the criteria related validity for the factor analysis. Following this clarification of the concepts of reliability and validity, in the next sections, factor analyses will be conducted to reduce the variables. Finally, as shown in Table 5.1, 5.2 and 5.3, the sample includes responses from a wide range of industries, ownership and organizational sizes, which provides some reassurance as to the representativeness of the sample.

5.4 Identification and Validation of Summated Scales

The aim of this section is to provide a brief overview of the purpose and application of factor analysis, before using it to critically explore the potential for combining individual variables, within a specific construct, into meaningful summated scales.

Factor analysis, is a data reduction technique, which seeks to find the underlying, latent variables, which although not readily observable, are reflected in the observed variables (Hair et al 1998; Field 2000). The ultimate objective of factor analysis is to find the fundamental structure of the data, based on the analysis of the correlation matrix of the variables involved (Field 2000). Factor analysis was carried out on the individual items scales for every construct that had been identified in the research framework, to better understand the structure of the data, and to help determine whether individual item measures could be combined into coherent and meaningful summated scales (Hair et al. 1998). This approach is commonly used within social science research for the purpose of reducing the complexity of the data and to make findings easier to interpret. The main principle behind using a summated scale is to represent a concept by combining several item measures into one single variable (Hair et al 1998). Accordingly, summated scale can, in the context of this study, provide this study two main benefits:
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1. It can help overcome the measurement error by reducing the reliance on a single response through the using of multi-indicators. By adopting an 'average' response to a set of variables, the measurement error that may occur in a single question (Hair et al 1998), can be decreased in this study;
2. By combining different item measures together, summated scales enable the representation of multiple aspects of a single concept (Hair et al 1998).

According to Hair et al (1998), in order to carry out an effective factor analysis, the ratio of the number of cases to the number of item measures that will be used for factor analysis must be greater than 5. As illustrated in Table 5.13, the above mentioned criteria were totally satisfied in this study.

To confirm the reliability of the factor analyses, the KMO measure and Bartlett’s test of sphericity were conducted for each construct. The KMO measure, which stands for Kaiser-Meyer-Olkin measure, is an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients (Norussis 1985). It is an important indicator, which is used to test whether or not the factor analysis could yield a distinct and reliable factor. Since the high value of KMO indicates that the pattern of the correlations of the items is compact, it can be used to signify the validity of the factor analysis (Field 2000).
According to Kaiser (1974), accepted threshold values for the KMO test should be no less than 0.5, and thus here it is adopted as the critical value for each of the factor analyses. Another important test is the Bartlett test, which is used to measure the appropriateness of the factor analysis. The recommended statistically significant level of Bartlett’s Sphericity test is less than 0.05 (p<0.05), which indicates that the correlation matrix is significantly different from the identify matrix (Hair et al 1998; Field 2000).

Meanwhile when it comes to choosing the number of factors to be extracted, the number suggested by SPSS, based upon factors whose communalities average is greater than 0.7, will be of first priority. Nevertheless, when it is less than 0.7 the scree plot will be employed to double check and then decide the number of factors to be extracted. Finally, the Eigen value, which is the sum of squared values in the column of a factor matrix, can be used as a kind of 'Cut-off point', by which the researcher can judge whether or not a factor accounts for at least one variable (Field 2000; Churchill 1991). Accordingly, it is important to calculate the Eigen Value, to ensure this value is greater than 1, which signifies that the factor accounts for at least one variable (Hair et al 1998).
### Table 5.13: Ratio of Cases to Item Measures

<table>
<thead>
<tr>
<th>Construct</th>
<th>No. of Item Measures</th>
<th>Cases</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP Benefit</td>
<td>15</td>
<td>124</td>
<td>8.3**</td>
</tr>
<tr>
<td>ERP Scale</td>
<td>6</td>
<td>124</td>
<td>21**</td>
</tr>
<tr>
<td>Flexibility</td>
<td>5</td>
<td>156</td>
<td>31**</td>
</tr>
<tr>
<td>Strategy</td>
<td>6</td>
<td>156</td>
<td>26**</td>
</tr>
<tr>
<td>Horizontal Relationship</td>
<td>5</td>
<td>156</td>
<td>31**</td>
</tr>
<tr>
<td>Standardization</td>
<td>4</td>
<td>156</td>
<td>39**</td>
</tr>
<tr>
<td>Centralization</td>
<td>4</td>
<td>156</td>
<td>39**</td>
</tr>
<tr>
<td>Configuration</td>
<td>4</td>
<td>156</td>
<td>39**</td>
</tr>
</tbody>
</table>

* Ratio>5, Minimal Acceptable  
** Ratio>20, Extremely Acceptable

Besides this technical consideration, it is also recommended that the number of factors to be extracted, should be informed by theory too (Hair et al. 1998). Therefore the judgment on how many factors to be extracted is rather a mix of technical and theoretical considerations.

Additionally it should be mentioned that as the study structural dimensions—centralization and standardization etc. - are all concepts which have been derived from past studies, especially the Aston Program (Pugh 1976). The validity of those constructs has been tested before. And in order to further test the validity Correlation tables are presented for each construct, by which each factor’s internal consistency could be validated. Furthermore, as the questionnaire has been piloted with a small sample of respondents, the inter-rater reliability (Sekaran 1992) of the constructs has been further supported.

### 5.4.1 Analysis of Construct of Configuration

Before undertaking factor analysis, it is often necessary to reverse code any individual item measure whose scaling is at odds with the construct’s other measures. In the case of the configuration construct, it was necessary to reverse code item three as the wording of this item represented an opposing position to the other three items in the construct.
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There are four items to be used for factor analysis for this construct. The factor analysis suggests two factors can be extracted from the four items. As can be seen from the rotated component matrix, illustrated in Table 5.14, the first, third and fourth items all appear to load onto a single factor, whilst the remaining item loads onto a factor of its own, and should be treated separately. As the items associated with the first factor share a common characteristic, namely, to downsize the organization, it was initially named as 'Downsize'. However, on further reflection it became clear that, whilst there were some similarities among these variables, there were also some significant differences. Ultimately, having adopted a theoretical lens (Perrow 1971; Perrow 1986; Englehardt and Simmons 2002), only the first and the third items were grouped into a factor, which was named: 'Levels of Hierarchy', as both of these item measures explicitly relate to an organization's hierarchical configuration. The remaining item [Con4] was left as single item factor.

Table 5.14: Rotated Component Matrix for Configuration Construct

<table>
<thead>
<tr>
<th>Items #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description</td>
<td>1</td>
</tr>
<tr>
<td>Con1</td>
<td>Our organization has a very strong hierarchical structure, with many layers between the most senior and most junior employees.</td>
<td>0.54</td>
</tr>
<tr>
<td>Con2</td>
<td>Each manager has a very large number of subordinates reporting directly to them.</td>
<td>0.88</td>
</tr>
<tr>
<td>Con3</td>
<td>The structure of our organization is very flat.</td>
<td>0.95</td>
</tr>
<tr>
<td>Con4</td>
<td>We try to minimize the number of subordinates reporting to any one manager.</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Although factor analysis [See Table 5.14] suggests that one factor can be created from two individual measures, validity and reliability need to be further explored. To test the factor's internal consistent reliability, correlation analysis was conducted to explore the correlation among the two items in factor one. Accordingly, correlation analysis confirmed that the two items [Con1, Con3] show significant correlations with one another [Correlation Coefficient is 0.44**]. The KMO value for the factor analysis is 0.54 is greater than 0.5 and the Barlett's test of Sphericity is less than 0.05.

In addition to the tests that have been introduced above, the Cronbach Alpha has also been calculated. The Cronbach Alpha (Cronbach, 1951) is an important
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indicator of the reliability of the generated summated scale, and it measures how well a set of items measure a single, uni-dimensional, latent construct (Christmann and Van Aelst 2006). It increases with the average correlation between items in a factor. Consequently, the reliability the factor one was also tested through Cronbach Alpha, and it resulted in an acceptable value of 0.614, as illustrated by Table 5.15. Moreover, the Eigen value for factor one, at 1.73, was comfortably over the threshold value of one.

Table 5.15: Reliability Statistics of Configuration Items

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.54</td>
</tr>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>76.4**</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>0.61</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>1.73</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

Thus based upon above analyses, it can be summarized that two items from the configuration construct can be meaningfully grouped into a single summated scale; whilst the remaining two item measures should be retained as independent variables.

5.4.2 Analysis of the Construct of Centralization

As discussed in the Chapter Four, the centralization construct has been adopted directly from Aiken and Hage (1967). The factor analysis suggests that for this construct a single factor can be extracted, which explains 49.46% of the accumulated variances [See Table 5.16]. Consequently, this factor has been simply named 'Centralization'.

The following categorisation is usually used to interpret Cronbach alphas: above 0.70 desirable; above 0.60 generally acceptable; above 0.50 acceptable in exploratory research. (Kaiser, 1978).
Table 5.16: Rotated Component Matrix for Centralization Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cen1</td>
<td>There can be little action taken in our organization until a supervisor approves the decision.</td>
<td>0.71</td>
</tr>
<tr>
<td>Cen2</td>
<td>Any employee wanting to make their own decisions would be quickly discouraged.</td>
<td>0.80</td>
</tr>
<tr>
<td>Cen3</td>
<td>Even relatively minor issues have to be referred to someone higher up for a final decision.</td>
<td>0.67</td>
</tr>
<tr>
<td>Cen4</td>
<td>Our employees generally feel empowered to take responsibility for making own decisions.</td>
<td>0.62</td>
</tr>
</tbody>
</table>

The validity of this construct has firstly been tested through correlation analysis. As it can be seen from Table 5.17 all of the four items showed strong associations with each other. Moreover, the validity of this construct has been confirmed by its KMO value of 0.70 and its Sphericity value, which is below 0.001, as shown by Table 5.18.

Meanwhile, since the construct has been explicitly derived from past studies, and as 'centralization' has, previously, been significantly and negatively associated with organizational size (Child 1969), it is also possible to test the theoretical validity of this construct through correlation analysis. In this study a significant negative association [0.28**] between organizational size and the centralization construct has been found, exactly as predicted in previous studies (Child 1972). The Cronbach’s Alpha of 0.65, is comfortably above the critical threshold for acceptable values [Refer to Table 5.18]. Finally the Eigen value has been checked and it scored at 1.98.

Table 5.17: Correlation of Centralization Items

<table>
<thead>
<tr>
<th></th>
<th>Cen1</th>
<th>Cen2</th>
<th>Cen3</th>
<th>Cen4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cen1</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cen2</td>
<td>Pearson Correlation</td>
<td>0.45**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cen3</td>
<td>Pearson Correlation</td>
<td>0.28**</td>
<td>0.37**</td>
<td>1</td>
</tr>
<tr>
<td>Cen4</td>
<td>Pearson Correlation</td>
<td>0.24**</td>
<td>0.35**</td>
<td>0.25**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Table 5.18: Reliability Statistics of Centralization Construct

<table>
<thead>
<tr>
<th>KMO Measure</th>
<th>0.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td>83.77**</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>0.65</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>1.98</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

5.4.3 Analysis of the Construct of Standardization

As illustrated in Table 5.19, the rotated factor analysis for the standardization construct suggests two factors to be extracted. Among the four variables, the last three were loaded onto the first factor, which explains 40.51% of the variances; it can be seen that the three items which combine into a single factors all describe the situation in which the organization is standardized through formal rules and regulations. Consequently, this factor is named as 'Formal Standardization'. By contrast, the remaining item measure focuses on informal rules or regulations, in the absence of formal ones. Thus it has been named as 'Informal Code of Conduct.'

Table 5.19: Rotated Component Matrix for Standardization Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sta1</td>
<td>If a written rule does not cover some situation, then we make up informal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rules for doing things as we go along.</td>
<td>0.90</td>
</tr>
<tr>
<td>Sta2</td>
<td>There are many operational aspects of our business that are not directly</td>
<td>b.85</td>
</tr>
<tr>
<td></td>
<td>covered by some formal rule or procedure.</td>
<td></td>
</tr>
<tr>
<td>Sta3</td>
<td>Our company has a strong culture of doing everything by the book.</td>
<td>b.77</td>
</tr>
<tr>
<td>Sta4</td>
<td>Rules and procedures are typically presented in a very formal and</td>
<td>b.46</td>
</tr>
<tr>
<td></td>
<td>documented manner.</td>
<td></td>
</tr>
</tbody>
</table>

The correlations amongst the three items factor one have been presented in Table 5.20, which illustrates the significant association between the three variables. Furthermore, as illustrated in Table 5.21, the KMO value is 0.50 and the sphericity is below 0.001. Therefore, the factor analysis is valid for the construct. However for the validity test, it was found that the Cronbach Alpha is slightly below 0.6 but above 0.5. As argued, for the exploratory study, above 0.5 is acceptable for the analysis.
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(Kaiser 1978). Finally, the Eigen value is also acceptable and scored at 1.62.

In addition to exploring the statistical reliability of the construct, it was also possible to confirm from the theoretical perspective. The test of the association among standardization, centralization, and organizational size show the significant association among them, which confirmed the construct validity. Among them, the formal standardization is negatively associated with size [0.33**] and positively associated with organization centralization [0.22**], which is in line with the extant theory that standardization is significantly and positively related with organizational size (Child 1972).

Table 5.20: Correlation of Standardization Items

<table>
<thead>
<tr>
<th></th>
<th>Sta2</th>
<th>Sta3</th>
<th>Sta4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sta2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sta3</td>
<td>0.42**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sta4</td>
<td>0.16*</td>
<td>0.28**</td>
<td></td>
</tr>
</tbody>
</table>

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

Table 5.21: Reliability Statistics of Standardization Construct

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.50</td>
</tr>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>66.70**</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>0.51</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>1.62</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

Thus the factor analysis for the construct of standardization generated one summated scale that was named as ‘Formal Standardization’ and the remaining stand alone measure has been coded as ‘Informal Code of Conduct.

5.4.4 Analysis of the Construct of Horizontal Relationship

Although the factor analysis for this construct has been conducted and two factors were extracted there from [See Table 5.22], the reliability of the two factors that is
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presented in Table 5.23, failed for the reliability test. In view of this, no summated scale has been adopted to group items, and consequently all of the items are to be studied individually.

Table 5.22: Rotated Component Matrix for Horizontal Integration Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI1</td>
<td>Our staff are comfortable to directly communicate with colleagues from different functional areas.</td>
<td>0.67</td>
</tr>
<tr>
<td>HI2</td>
<td>There are very strong boundaries between each functional area.</td>
<td>0.75</td>
</tr>
<tr>
<td>HI3</td>
<td>People from different departments typically share very similar objectives.</td>
<td>0.65</td>
</tr>
<tr>
<td>HI4</td>
<td>When people from different functional areas get together, the atmosphere is typically very tense.</td>
<td>0.83</td>
</tr>
<tr>
<td>HI5</td>
<td>The maintenance of informal communication channels between departments is a high priority within our organization.</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Table 5.23: Reliability Statistics of Horizontal Relationship Construct

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.57</td>
</tr>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>55.87**</td>
</tr>
<tr>
<td>Cronbach's Alpha (Factor 1)</td>
<td>0.47</td>
</tr>
<tr>
<td>Cronbach's Alpha (Factor 2)</td>
<td>0.45</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>1.73</td>
</tr>
</tbody>
</table>

5.4.5 Construct of Strategy

The factor analysis of the strategy construct, resulted in the emergence of only one candidate factor from SPSS, which accounted for 50.00% of the variance, [See in Table 5.24]. Since all items, loading onto this single factor, describe a kind of strategy typology, the factor has been simply named as 'Strategy'.
Table 5.24—Rotated Component Matrix for Strategy Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Str1</td>
<td>We can quickly adjust the capacity / volume of our production processes,</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>when needed.</td>
<td></td>
</tr>
<tr>
<td>Str2</td>
<td>Our company can, if necessary, introduce a wide variety of product features.</td>
<td>0.78</td>
</tr>
<tr>
<td>Str3</td>
<td>We typically find it difficult to adjust our product mix, to suit the changing</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>requirements of the market.</td>
<td></td>
</tr>
<tr>
<td>Str4</td>
<td>Our organization often experiences difficulties when adjusting its standard</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>production processes.</td>
<td></td>
</tr>
<tr>
<td>Str5</td>
<td>Where necessary, we can restructure our organization, in a relatively short</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>period of time, without incurring too much extra cost.</td>
<td></td>
</tr>
<tr>
<td>Str6</td>
<td>We can quickly adjust the capacity / volume of our production processes,</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>when needed.</td>
<td></td>
</tr>
</tbody>
</table>

For this factor, the KMO value is a highly significant 0.79 and the Barlett’s sphericity is below 0.001 [See Table 5.25]. Furthermore, the inter-item correlations among items, as illustrated in Table 5.26, all show significant association with each other. Cronbach’s alpha has also been calculated, which scores at 0.79 for testing the reliability of the summated scale, as illustrated in Table 5.25. Finally, the Eigen value has been found to be 3.0, greater than 1.

Table 5.25: Reliability Statistics of Strategy Construct

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.79</td>
</tr>
<tr>
<td>Barlett’s Test of Sphericity</td>
<td>283.29**</td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>0.79</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>3.0</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level
Table 5.26: Correlation of Strategy Items

<table>
<thead>
<tr>
<th></th>
<th>Str1</th>
<th>Str2</th>
<th>Str3</th>
<th>Str4</th>
<th>Str5</th>
<th>Str6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Str1</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Str2</td>
<td>Pearson Correlation</td>
<td>0.31**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Str3</td>
<td>Pearson Correlation</td>
<td>0.27**</td>
<td>0.60**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Str4</td>
<td>Pearson Correlation</td>
<td>0.26**</td>
<td>0.57**</td>
<td>0.56**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Str5</td>
<td>Pearson Correlation</td>
<td>0.29**</td>
<td>0.45**</td>
<td>0.38**</td>
<td>0.52**</td>
<td>1</td>
</tr>
<tr>
<td>Str6</td>
<td>Pearson Correlation</td>
<td>0.25**</td>
<td>0.23**</td>
<td>0.23**</td>
<td>0.34**</td>
<td>0.56**</td>
</tr>
</tbody>
</table>

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

Therefore, this construct gave rise to only one summated scale and it was coded as 'Strategy'.

5.4.6 Analysis of the Construct of Flexibility

As suggested by Table 5.27, factor analysis reduces the five items into two distinct factors which account for 64.40% of accumulated variance. The items of first, second, and fifth, all relate to the organizational flexibility. By contrast, the third and fourth items are closely linked with the production technology. In view of this, those two factors are named as 'Organizational Flexibility' and 'Production Flexibility', respectively.

Table 5.27: Rotated Component Matrix for Flexibility Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fle1</td>
<td>We can quickly adjust the capacity / volume of our production processes,</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>when needed.</td>
<td>0.75</td>
</tr>
<tr>
<td>Fle2</td>
<td>Our company can, if necessary, introduce a wide variety of product</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>features.</td>
<td>0.71</td>
</tr>
<tr>
<td>Fle3</td>
<td>We typically find it difficult to adjust our product mix, to suit the</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>changing requirements of the market.</td>
<td>0.81</td>
</tr>
<tr>
<td>Fle4</td>
<td>Our organization often experiences difficulties when adjusting its</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>standard production processes.</td>
<td>0.74</td>
</tr>
<tr>
<td>Fle5</td>
<td>Where necessary, we can restructure our organization, in a relatively</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>short period of time, without incurring too much extra cost.</td>
<td>0.74</td>
</tr>
</tbody>
</table>
The sphericity is below 0.001 while the KMO value is 0.60, as illustrated by Table 5.28. As suggested by Kaiser (1974), the KMO value should no less than 0.5, according to which the KMO value of this test is still acceptable. Also, the correlation test for items in the single factor show significant associations, as illustrated by Tables 5.29. The Cronbach's alpha, as presented in Table 5.28, for first factor is 0.64, greater than 0.6 and alpha for next factor is 0.51. Although the next factor is below 0.6 but higher than 0.5, this could be also accepted for the study (Kaiser 1974). At the same time, the Eigen values of the two factors have been checked and they all scored higher than 1.

Table 5.28: Reliability Statistics for Flexibility Construct

<table>
<thead>
<tr>
<th>KMO Measure</th>
<th>0.60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>95.66**</td>
</tr>
<tr>
<td>Cronbach's Alpha (Factor 1)</td>
<td>0.64</td>
</tr>
<tr>
<td>Cronbach's Alpha (Factor 2)</td>
<td>0.51</td>
</tr>
<tr>
<td>Eigen Value (Factor 1)</td>
<td>1.85</td>
</tr>
<tr>
<td>Eigen Value (Factor 2)</td>
<td>1.36</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

Table 5.29: Correlation of Flexibility Items

<table>
<thead>
<tr>
<th></th>
<th>Fle1</th>
<th>Fle2</th>
<th>Fle3</th>
<th>Fle4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fle1</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fle2</td>
<td>Pearson Correlation</td>
<td>0.38**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fle3</td>
<td>Pearson Correlation</td>
<td>0.38**</td>
<td>0.36**</td>
<td>1</td>
</tr>
<tr>
<td>Fle4</td>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
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5.4.7 Analysis of the Construct of ERP Scale

Factor analysis of the ERP construct, as presented by Table 5.30, suggests two factors should be extracted. The first factor consists of all items with the exception of item 3. And since these items all relate to the physical coverage of the ERP system in the organization, it has been named as ‘ERP Coverage’. By contrast, the third item relates to the authorization for ERP system usage, it has been named as ‘ERP Authorization’.

Table 5.30: Rotated Component Matrix for ERP Scale Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sca1</td>
<td>Our ERP implementation comprises a small number of functional modules, rather than a complete enterprise-wide system.</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>Sca2</td>
<td>Most of our computers / work stations are connected to the ERP system.</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Sca3</td>
<td>Access to information from the ERP system is strictly restricted to a limited numbers of users with appropriate authorization.</td>
<td></td>
<td>0.88</td>
</tr>
<tr>
<td>Sca4</td>
<td>A large proportion of our staff use the ERP system on a daily basis.</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Sca5</td>
<td>The ERP system supports the vast majority of our organization's functional areas.</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Sca6</td>
<td>Our ERP system has been significantly customized to meet organizational requirements.</td>
<td>0.45</td>
<td></td>
</tr>
</tbody>
</table>

First of all the correlation table was produced for the five factor items. It can be seen in the Table 5.31 that most variables are correlated reasonably well except that the sixth and fourth items don't have significant correlation. In view of this, KMO and Sphericity were used for further validation. It was found that KMO value is 0.69 and significance was less than 0.001. Thus the factor one could be validated by the tests. Meanwhile the Cronbach's coefficient, as seen in Table 5.32, is calculated to test the reliability of the factor one. As suggested by below table, the value is 0.66 which is greater than 0.6.
Table 5.31: Correlation of ERP Scale Items

<table>
<thead>
<tr>
<th></th>
<th>Sca1</th>
<th>Sca2</th>
<th>Sca4</th>
<th>Sca5</th>
<th>Sca6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sca1</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sca2</td>
<td>Pearson Correlation</td>
<td>0.40**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sca4</td>
<td>Pearson Correlation</td>
<td>0.19*</td>
<td>0.48**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sca5</td>
<td>Pearson Correlation</td>
<td>0.35**</td>
<td>0.40**</td>
<td>0.32**</td>
<td>1</td>
</tr>
<tr>
<td>Sca6</td>
<td>Pearson Correlation</td>
<td>0.16</td>
<td>0.15</td>
<td>0.17</td>
<td>0.23**</td>
</tr>
</tbody>
</table>

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

Table 5.32: Reliability Statistics for ERP Scale Construct

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.69</td>
</tr>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>96.29**</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>0.66</td>
</tr>
<tr>
<td>Eigen Value</td>
<td>2.2</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

Thus the factor analysis in this part gives rise to one summated scale that was named as ‘ERP Coverage’; the remaining one will be used as a separate variable.

5.4.8 Analysis of the Construct of ERP Benefits

Factor analysis for the ERP Benefits construct suggests two factors to be extracted which account for 63.52% of the accumulated variances. The detailed rotated component matrix for this construct can be found in Table 5.33.
### Table 5.33—Rotated Component Matrix for ERP Benefits Construct

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben 1</td>
<td>Communication within our organization.</td>
<td>0.59</td>
</tr>
<tr>
<td>Ben 2</td>
<td>Business innovations.</td>
<td>0.71</td>
</tr>
<tr>
<td>Ben 3</td>
<td>Quality and availability of information for decision making.</td>
<td>0.64</td>
</tr>
<tr>
<td>Ben 4</td>
<td>Ability to develop business alliances and external linkages.</td>
<td>0.50</td>
</tr>
<tr>
<td>Ben 5</td>
<td>Cost reductions within our business.</td>
<td>0.63</td>
</tr>
<tr>
<td>Ben 6</td>
<td>Monitor the performance of staff and business processes.</td>
<td>0.84</td>
</tr>
<tr>
<td>Ben 7</td>
<td>Reduce the costs of our Information Technology.</td>
<td>0.65</td>
</tr>
<tr>
<td>Ben 8</td>
<td>Integration of our business/ processes</td>
<td>0.62</td>
</tr>
<tr>
<td>Ben 9</td>
<td>Enterprise-wide decision support facilities.</td>
<td>0.76</td>
</tr>
<tr>
<td>Ben 10</td>
<td>Respond to customers effectively.</td>
<td>0.88</td>
</tr>
<tr>
<td>Ben 11</td>
<td>Versatile means of communication.</td>
<td>0.69</td>
</tr>
<tr>
<td>Ben 12</td>
<td>Productivity / efficiency of our business processes.</td>
<td>0.52</td>
</tr>
<tr>
<td>Ben 13</td>
<td>Facilitated cycle-time reductions.</td>
<td>0.73</td>
</tr>
<tr>
<td>Ben 14</td>
<td>Differentiate our products and services.</td>
<td>0.86</td>
</tr>
<tr>
<td>Ben 15</td>
<td>Increased our IT infrastructure capability.</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Having successfully isolated two distinct factors, the common suite of validity and reliability test are conducted. First of all the correlation Table 5.34 and Table 5.35 were developed for the two factors, respectively. It can be seen that all of the items, in each factor show significant associations with one another. Furthermore, the KMO value for this test is 0.91 and the significance of sphericity is less than 0.001 [See Table 5.36]. Cronbach’s Alpha for the two factors are 0.88 and 0.92 respectively [See Table 5.36]. At the same time, both Eigen values of the two factors have been found greater than 1 and thus acceptable. In terms of naming the factors, as the first factor items are related closely with organizational information and communication,
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describe this factor as the ‘**Informational Benefits**’; By contrast, the second factor items are related more closely with the organizational operation, and thus the second factor is called ‘**Operational Benefits**’.

**Table 5.34: Correlation Table (Informational Benefits)**

<table>
<thead>
<tr>
<th></th>
<th>Ben1</th>
<th>Ben3</th>
<th>Ben6</th>
<th>Ben7</th>
<th>Ben8</th>
<th>Ben9</th>
<th>Ben15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Table 5.35: Correlation (Operational Benefits)**

<table>
<thead>
<tr>
<th></th>
<th>Ben2</th>
<th>Ben4</th>
<th>Ben5</th>
<th>Ben10</th>
<th>Ben11</th>
<th>Ben12</th>
<th>Ben13</th>
<th>Ben14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Correlation is significant at the 0.05 level (2-tailed).**
Table 5.36 Reliability Statistics for ERP Benefits Construct

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO Measure</td>
<td>0.91</td>
</tr>
<tr>
<td>Barlett's Test of Sphericity</td>
<td>1238**</td>
</tr>
<tr>
<td>Cronbach's Alpha (Informational Benefits)</td>
<td>0.88</td>
</tr>
<tr>
<td>Cronbach's Alpha (Operational Benefits)</td>
<td>0.92</td>
</tr>
<tr>
<td>Eigen Value (Informational Benefits)</td>
<td>8.3</td>
</tr>
<tr>
<td>Eigen Value (Operational Benefits)</td>
<td>1.3</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level

Therefore, in this part factor analysis gave rise to two summated scales and they are named as 'Informational Benefits' and 'Operational Benefits' respectively.

5.5 Cluster Analysis of Strategy Construct

After presenting the factor analysis results in above sections, another statistic method that can be used for data reduction (Hair et al 1998) is cluster analysis. It is powerful in grouping cases into categories and thus provides insights into the data from different perspectives. Furthermore, Miles and Snow (1978) offer four distinct strategy typologies that can be used for the data reduction for this study. Therefore, it is expected, that this study can compare the structural differences between different strategy typologies that result from cluster analysis and thus provide reassurance for correlation analyses to be carried out in next chapter.

Cluster analysis can be used to group cases according to their common parameters or characteristics (Hair et al. 1998; Tacq 1997). Cluster analysis is different from other quantitative analyses methods, as it doesn't assume causal relationship among variables (Tacq 1997). Consequently cluster analysis is called Non-independent approach and mainly used for exploratory purposes. It was argued that this method could benefit this study by dividing cases into different strategy groups, which would facilitate cross group comparisons. Since the quantitative data analysis should always be informed by theories (Hair et al. 1998; Aldenderfer and Blashfield 1984), Miles and Snows' (1984) scheme of the strategy typology provides the conceptual foundation for clustering cases. For this analysis, six items of the strategy construct will be used as the variables for clustering cases.
Commonly three cluster methods could be used for the clustering purpose, namely hierarchical clustering, two step clustering and k means clustering (Hair et al. 1998; Ketchen and Shook 1996). In comparison with other two methods, k means clustering analysis requires the analyzer to prescribe the number of clusters to be extracted from the sample (Tacq 1997; Ketchen and Shook 1996; Hair et al. 1998). Although theoretically Miles and Snow (1984) provided four strategy typologies, it is unnecessary that all these strategy typologies adopters will install ERP system. Furthermore, since two step analysis and hierarchical analysis can cluster cases according to the expressed patterns of data. It is more desirable to adopt the two methods to give a more convincing result. However, it is suggested that two step analysis should be used for clustering dataset that contains large number of cases (Hair et al. 1998). The number of cases provided in this analysis is limited. In addition several authors (Ketchen and Shook 1996; Millingan 1980) have suggested two step clustering can be adopted as the major improvement of clustering analysis. This is because it can help to combine the clustering analysis with the non-hierarchical clustering analysis that requires the a priori specified clusters. Therefore, two step analysis was used here as the supplementary method to confirm the number of cases to be extracted from the data.

As indicated by Table 5.37, both the BIC indicator, and the ratio of distance measure suggest that two clusters should be extracted from the cases. More specifically, to determine the number of clusters, it is common to use Schwarz's (1978) Bayesian Information Criterion (BIC). Usually, smaller values of the BIC suggest better models. However, there will be circumstances in which the BIC will continue to decrease as the number of clusters increases. In such situations, the changes in the distance measure are evaluated to determine the best cluster solution. Consequently, the best solution will typically have a low BIC value, but the largest ratio of distance measures. It can be seen in Table 5.37 that the smallest BIC indicator is 595.03, whilst the largest ‘Ratio of Distance’ measure is 3.12, which taken together, provide strong support for the proposition that number of clusters to be generated by the two step cluster analysis should be two.
Table 5.37: Two Step Cluster Analysis

<table>
<thead>
<tr>
<th>Number of Clusters</th>
<th>Schwarz's Bayesian Criterion (BIC)</th>
<th>BIC Change(a)</th>
<th>Ratio of BIC Changes(b)</th>
<th>Ratio of Distance Measures(c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>697.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>595.03</td>
<td>-102.88</td>
<td>1.00</td>
<td>3.12</td>
</tr>
<tr>
<td>3</td>
<td>603.06</td>
<td>8.03</td>
<td>-0.08</td>
<td>1.32</td>
</tr>
<tr>
<td>4</td>
<td>623.79</td>
<td>20.73</td>
<td>-0.20</td>
<td>1.25</td>
</tr>
<tr>
<td>5</td>
<td>652.55</td>
<td>28.76</td>
<td>-0.28</td>
<td>1.02</td>
</tr>
<tr>
<td>6</td>
<td>681.80</td>
<td>29.26</td>
<td>-0.28</td>
<td>1.38</td>
</tr>
<tr>
<td>7</td>
<td>719.68</td>
<td>37.88</td>
<td>-0.37</td>
<td>1.22</td>
</tr>
<tr>
<td>8</td>
<td>761.66</td>
<td>41.98</td>
<td>-0.41</td>
<td>1.23</td>
</tr>
<tr>
<td>9</td>
<td>807.12</td>
<td>45.46</td>
<td>-0.44</td>
<td>1.30</td>
</tr>
<tr>
<td>10</td>
<td>856.07</td>
<td>48.95</td>
<td>-0.48</td>
<td>1.01</td>
</tr>
<tr>
<td>11</td>
<td>905.18</td>
<td>49.11</td>
<td>-0.48</td>
<td>1.00</td>
</tr>
<tr>
<td>12</td>
<td>954.33</td>
<td>49.15</td>
<td>-0.48</td>
<td>1.07</td>
</tr>
<tr>
<td>13</td>
<td>1004.20</td>
<td>49.86</td>
<td>-0.48</td>
<td>1.05</td>
</tr>
<tr>
<td>14</td>
<td>1054.58</td>
<td>50.39</td>
<td>-0.49</td>
<td>1.22</td>
</tr>
<tr>
<td>15</td>
<td>1106.77</td>
<td>52.19</td>
<td>-0.51</td>
<td>1.17</td>
</tr>
</tbody>
</table>

a The changes are from the previous number of clusters in the table.
b The ratios of changes are relative to the change for the two cluster solution.
c The ratios of distance measures are based on the current number of clusters against the previous number of clusters.

In view of the result from two step analysis, the hierarchical clustering analysis is then adopted to view the number of clusters to be extracted for confirmatory purpose. The nearest neighbour method with Euclidean distance interval measure is first adopted to find the 'Sudden jump' of the distances. It was shown that for stage 152 and 153 a sudden jump of the value is found which means two or three clusters should be extracted. Also the furthest neighbour is also used to confirm the analysis. The differences between them is that furthest neighbour method found two jumps, the latter one, also the largest jump, implying two clusters to be extracted.

Although both preliminary analyses suggested that two clusters should be extracted from the data, cluster analysis is exploratory in nature and the pattern of data found through it might not necessarily be meaningful. In this case, the study Miles and Snow's (1978) typology will be adopted, to interpret the data and understand clusters. But before exploring its meaningfulness, the distinctiveness of the derived clusters and their validity should be looked at (Doherty et al. 1999). For the
validation of cluster analysis, stability is of high importance (Green et al. 1988). The stability of the cluster analysis could be naturally tested through re-sampling from the data without essential change of the data. According to this, the cases with ERP are taken out as independent samples and thus hierarchical cluster analysis is conducted again, the resulted membership of cases is very similar to the original hierarchical cluster analysis.

Furthermore, the ANOVA analysis is conducted in order to find the distinctiveness of the groups of cases for strategy variables (Ketchen and Shook 1996). As shown in Table 5.38 the averages of the two groups are significantly different from each others. Moreover cases of cluster one exhibit higher average scores for all items, which means those companies focus more on quality, new markets, new products and new initiatives, in order to seek a position of market leadership.

Table 5.38: Mean Rating and Significance

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Clu1</th>
<th>Clu2</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Str1</td>
<td>We can quickly adjust the capacity/volume of our production processes, when needed.</td>
<td>5.3</td>
<td>4.4</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Str2</td>
<td>Our company can, if necessary, introduce a wide variety of product features.</td>
<td>5.7</td>
<td>3.2</td>
<td>130</td>
<td>0</td>
</tr>
<tr>
<td>Str3</td>
<td>We typically find it difficult to adjust our product mix, to suit the changing requirements of the market.</td>
<td>5.4</td>
<td>2.9</td>
<td>87</td>
<td>0</td>
</tr>
<tr>
<td>Str4</td>
<td>Our organization often experiences difficulties when adjusting its standard production processes.</td>
<td>5.4</td>
<td>2.8</td>
<td>123</td>
<td>0</td>
</tr>
<tr>
<td>Str5</td>
<td>Where necessary, we can restructure our organization, in a relatively short period of time, without incurring too much extra cost.</td>
<td>5.9</td>
<td>4.2</td>
<td>68</td>
<td>0</td>
</tr>
<tr>
<td>Str6</td>
<td>We can quickly adjust the capacity / volume of our production processes, when needed.</td>
<td>5.9</td>
<td>4.3</td>
<td>41</td>
<td>0</td>
</tr>
</tbody>
</table>

Miles and Snow's (1984) scheme segments organizations into four categories. Compared with 'Defender' and 'Prospector' strategy, 'Analyze' and 'React' strategy adopter will commonly not invest lots of their money on the new technologies and to be leaders for market or production technology initiatives. They are rather reactive to the new things (Miles and Snow 1978). Furthermore, according to Miles and Snow (1978), 'Analyze' and 'React' should lag behind 'Defender' and 'Prospector' in adoption of new technology. In addition to the criteria-related judgment on how many clusters to be extracted, as mentioned in the literature review chapter, at moment, the number of companies that have already
adopted ERP in China is not as great as western countries due to the highly cost of the project. This may preclude the strategy groups such as analyzer or reactor to be the leaders in adopting this software. Also Rich (1992) suggested that classification system is only meaningful if it: 'mirrors the real world, describing organizational reality in a way that is recognizable to and consistent with the vision of parishioners and researchers alike as a viable reproduction of the diverse world in which we live and study'. Therefore and in view of above validation steps informed by theory, two or three cluster could be better choices for the cluster analysis. In view of this, the two clusters should be the 'Defender' strategy adopters and 'Prospector' strategy adopters. In particular, the cluster of cases whose average score for the six items are much higher show similar characteristics of prospector that were described by Miles and Snow (1978) and detailed in Chapter Three.

5.6 Summary

In this chapter, factor analysis is employed for the purpose of variable reduction and the summated scales derived from the factor analysis are all listed in Table 5.39. It was found that most of the constructs in the questionnaire could be reduced to one or two factors except for the departmental relationship, which failed for the reliability test and thus will have to be studied in terms of its individual items. Meanwhile, while the validity and reliability tests adopted directly through SPSS are all satisfactory, the associations showed among different variables further confirm past organizational studies that suggested that organization size is significantly and positively related with organizational standardization and negatively with centralization (Pugh et al. 1968; Child 1969). Generally speaking, the constructs which represents the concepts that have been empirically studied before show similar characteristics as past studies. Centralization, for example, is strongly associated with organizational size and standardization. This is also partly confirmed the criteria related validity of the constructs and also the reliability of those constructs.

However, the summation of the items into scales is not the ultimate objective of the quantitative study. Instead, these initial analyses lay the foundation for further quantitative studies of the hypothesized relationship. In the next chapter, the detailed data analyses would be carried out and presented, in which the correlation analysis, cluster analysis and comparison analysis are conducted to test the hypothesized relationships stated in Chapter Three.
### Table 5.39: Characteristics & Descriptions of Summated Scales

<table>
<thead>
<tr>
<th>Summated Scales</th>
<th>Description</th>
<th>High Value</th>
<th>Low Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of Hierarchy</td>
<td>Composed of two items; Measure whether organization has large vertical span of control</td>
<td>Tall Organization</td>
<td>Flat Organization</td>
</tr>
<tr>
<td>Centralization</td>
<td>Composed of four items; Measure the extent to which the staff are empowered to make decision</td>
<td>Highly Centralized Structure</td>
<td>Highly Decentralized Structure</td>
</tr>
<tr>
<td>Formal Standardization</td>
<td>Composed of three items; Measure how widely spread of the written rules and regulations in organization.</td>
<td>High levels of standardized written rules</td>
<td>Low levels of standardized written rules</td>
</tr>
<tr>
<td>Strategy</td>
<td>Composed of six items; Measure the degree of similarity to prospector strategy</td>
<td>Prospector Oriented Strategy</td>
<td>Defender Oriented Strategy</td>
</tr>
<tr>
<td>ERP Coverage</td>
<td>Composed of four items; Measure how widely the ERP spreads across organization</td>
<td>Wide ERP Coverage</td>
<td>Narrow ERP Coverage</td>
</tr>
<tr>
<td>Organizational Flexibility</td>
<td>Composed of four items; Measure how flexible organization cope with structural change</td>
<td>High flexibility relating to structural change</td>
<td>Low flexibility relating to structural change</td>
</tr>
<tr>
<td>Production Flexibility</td>
<td>Composed of four items; Measure how easily organization deal with production technology</td>
<td>High flexibility relating to production technology</td>
<td>Low flexibility relating to production technology</td>
</tr>
<tr>
<td>Informational Benefit</td>
<td>Composed of four items; Measure how much information related benefit are enjoyed such as availability of information for decision making.</td>
<td>Many information related ERP benefits</td>
<td>Few information related ERP benefits</td>
</tr>
<tr>
<td>Operational Benefit</td>
<td>Composed of four items; Measure how much information related benefits are enjoyed such as speed of responding to customer.</td>
<td>Many ERP operational benefits</td>
<td>Few ERP operational benefits</td>
</tr>
</tbody>
</table>
Chapter 6

Quantitative Data Analysis
Chapter 6—Quantitative Data Analysis

6.1 Introduction

In the previous chapter, factor analysis was carried out for the purpose of reducing the number of variables, where possible. Moreover, the means of the variables presented in last chapter provided a short description of each variable to provide insights into its nature. Whilst these analyses provided important insights into the characteristics of the data set, they can't in themselves help to identify any association between the variables. For this reason, correlation analysis and other statistical techniques are used, in this chapter, to explore the relationships between various variables.

This Chapter focuses on presenting the results of quantitative analyses and thus tries to explore whether the hypotheses of the study are supported by the quantitative data, using individual research variable as well as the summated scales, generated in the previous Chapter. The primary data analysis method used for this part of the study is correlation analysis. Correlation analysis aims to identify any significant associations between pairs of variables, and thus provides evidence either to support or reject the hypothesized influences of independent variables on the dependent variables (Hair et al 1998).

In order to effectively present the quantitative data analysis, the chapter is structured into a further seven sections. Section 6.2 aims to introduce and review the statistical techniques to be adopted for the subsequent tests of hypotheses. Section 6.3 focuses on the tests of the hypothesized relationship between strategy and structure. Section 6.4 focuses on exploring the relationship between strategy and ERP. Section 6.5 concentrates on the core relationship of the study, namely the relationship between ERP and structure. Sections 6.6 and 6.7 will then be used to understand how organizational structure and the adoption of ERP might influence the degree of flexibility enjoyed by the organizations. Finally, Section 6.8 summarizes the findings from the data analyses presented in this chapter.

6.2 Methods for Testing Hypotheses

In the following sections, correlation analyses will be adopted as the primary quantitative method to explore the hypothesized relationships between different pairs of research constructs. Correlation analysis was chosen for this purpose as it is very effective at testing the strength of association between pairs of metric
variables such as those in the data set.

The correlation approach will be applied to study the strength of the associations between a variety of variables. A correlation refers to the relationship between two or more sets of variables and serves as the means of identifying the possible relationships between variables or phenomena. It has been argued that this relationship is comprised of three important elements: significance, direction and magnitude (Cohen and Cohen 1983). While the direction and the magnitude can be indicated by the correlation coefficient, the significance of the magnitude is represented by the Pearson's 'r' statistic, which is calculated by dividing the covariance of the two variables by the product of their standard deviations.

The correlation coefficient is a value, which ranges between -1 and +1. To a large extent, it represents the strength of the linear relationship between two variables. More specifically, a value which tends towards the extremes of the range [-1 or +1], represents a strong relationship between two variables, whereas weak associations deliver values that are closer to zero. However, in the social sciences, due to the complexity of the entities being studied, and the difficulties of getting very large samples, the values of the derived correlation coefficients tend to be lower than those that might be expected in the natural sciences. This then creates a problem for the social researcher in judging the validity and of any association detected through correlation analysis. Thus, the 'significance of the correlation coefficient' is an important measure, which is used to judge the likelihood of any misinterpretation (Alexander et al 1984). The measure of the 'significance of the correlation coefficient' denotes how unlikely a given correlation will occur when there is no inherent relationship between two variables. For example, previous empirical studies in the information systems' domain have confirmed the importance of the 'significance of the correlation coefficient', rather than the actual value of the correlation coefficient, as the criterion for judging the validity of the correlation. In Choe's (1996) empirical studies of the accounting information system, although the generated correlation coefficients were quite low, the significance level has been adopted to judge the existence of a significant association between different variables. Similarly, in other studies (e.g. Kirschenbaum 2004) the 'significance of the correlation coefficient' has been adopted for judging the validity of the correlation, though the reported correlation coefficients are relatively low.

Another problem associated with correlation analysis is interpreting the direction of
causality (Field 2000). Although the negative or positive association can provide important information with regards to how the two variables are linked, it can’t explicitly identify which variable influences the other. In this study, the problem is tackled in two ways. Firstly, as all hypotheses are theory driven - that is, the reviewed literature has been used to generate all the variables and hypotheses - it is possible to make some informed assumptions as to which of any pair of variables in a relationship is likely to be the independent variable. Secondly, and perhaps more importantly, the qualitative element of the data analysis has been explicitly designed to help design and confirm the direction of causality, by providing a ‘thick description’ of each hypothesized relationship (Dey 1993).

6.3 Strategy and Structure

The quantitative data analysis starts by testing the association between organizational strategy and structure, rather than starting from the main focus of the study, namely the association between ERP and organizational structure. The reason for this is that as strategy has been hypothesized to influence both organizational design and ERP adoption, it provides a natural point of departure. Moreover, it was envisaged that by testing the association between strategy and structure, important new insights would be provided into how strategy influences structure.

The traditional view of the relationship between strategy and structure is that structure follows strategy (Lynch 2000). Organizational structure can be viewed as a mechanism for fulfilling strategy (Lynch 2000). Accordingly, the relationship between strategy and structure, that has been hypothesized, is one in which strategy influences structure (Mintzberg 1995) [See Figure 6.1]. Consequently in this hypothesis, strategy acts as the independent variable, whilst structure is modeled as a portfolio of four dependent variables. To test the strength of this relationship, the study adopted correlation analysis for measuring the level of association.
6.3.1 Strategy and Configuration

To test the relationship between strategy and configuration, a set of correlation analyses were conducted, and the results have been presented in Table 6.1. It can be clearly seen that significant correlations have been detected between organizational strategy and all of the configuration variables. More specifically, there is negative association between the number of 'levels of hierarchy' and the type of strategy being adopted. As a high strategy score is indicative of the 'Prospector' strategy, this result indicates that the closer the organizational strategy is to the 'Prospector' archetype, the flatter the organizational hierarchy is likely to be. This result provides important new evidence in support of hypothesis 1a, which is well aligned with the work Miles and Snow (1978), in that 'Prospector' organizations are seen to be adopting a kind of structure which is very different from traditional, multi-layered, bureaucratic structures. The hierarchical organization has often been criticized for its 'information distortion' (Pfeffer 1978; Aldrich 1979; Fincham and Rhodes 1999) and thus its inability to cope with emerging problems and opportunities (Brubaker 1984). This is because the information needs to pass through too many vertical layers. Consequently, by adopting flatter structures, 'Prospector' organizations can be more flexible and responsive (Mansfield 1984; Fincham and Rhodes 1999).
Table 6.1: Correlation Results: Strategy and Configuration

<table>
<thead>
<tr>
<th>Hypothesis 1a</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of Hierarchy</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
<tr>
<td>Number of Subordinates</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
<tr>
<td>Effort to reduce No. of Subordinates</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Moreover, it can be seen that there is a significant positive association between the average 'numbers of subordinates' and the type of organizational strategy being deployed. More specifically, the closer the organizational strategy is to 'Prospector', the larger will be the number of staff being supervised by every manager, a result which also supports hypothesis 1a.

At the same time, a significant and positive association has been found between organizational strategy and the 'efforts to reduce the span of control', which means the closer the organizational strategy is to 'Prospector' type, the more likely the organization will try to reduce its span of control. This seems to be in conflict with the association between organizational strategy and the number of subordinates controlled by one manager. However, an alternative interpretation might be that when the organizational strategy is closer to the 'Prospector' type, and it has adopted an extended span of control, it will, if conditions permit, place more emphasis on reducing its headcount (Patterson et al. 2003). This result, together with the positive association, found between organizational strategy and the number of hierarchical levels, might suggest that 'Prospector' organizations, are generally keen to downsize their organization in order to gain more flexibility (Barnatt 1996).

In sum, these results suggest that the 'Prospector' type organizations will typically adopt a kind of configuration, which is distinctly different from traditional
bureaucratic structures. In line with Miles and Snow's (1978) work, the 'Prospector' organizations have been found to have a larger span of control, in order to reduce their number of hierarchical levels and thus better respond to the prevailing market conditions (Mansfield 1984; Fincham and Rhodes 1999). To conclude, the correlation analysis here provides important new statistical evidence in support of Hypothesis 1a.

In addition to the correlation analysis, T tests that compare the means of the configuration variables for the 'Prospector' and 'Defender' clusters were conducted in order to provide more insight into the relationship. As presented in Table 6.2, it can be seen that there are significant differences for the means of 'effort to reduce span of control', 'number of subordinate' and 'number of hierarchical level'. Though the difference for the means of 'number of subordinate' is 0.10, slightly higher than 0.05, it still provide some evidence in support of correlation analysis. In particular, these analyses support the hypothesis that the 'Prospector' organizations generally have larger spans of control and fewer levels of hierarchy, while they still prioritize efforts to reduce their span of control, in order to reduce organizational size. These results confirm the correlation analyses and suggest that the type of strategy that an organization follows has significant implications for the design of its configuration.

Table 6.2: T Test: Strategy and Configuration

<table>
<thead>
<tr>
<th>Hypothesis 1a</th>
<th>Number of Subordinates</th>
<th>Effort to reduce Span</th>
<th>Levels of Hierarchical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>'Prospector'</td>
<td>4.63</td>
<td>4.14</td>
</tr>
<tr>
<td></td>
<td>'Defender'</td>
<td>4.12</td>
<td>3.51</td>
</tr>
<tr>
<td>T-test</td>
<td>T</td>
<td>1.68</td>
<td>2.04*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.10</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.3.2 Strategy and Standardization

In this study, it has been hypothesized that the 'Prospector' organizations will be more likely to adopt a standardized organizational structure, which runs counter to the received wisdom of Miles and Snow (1978). The reason for hypothesizing a positive association between organizational standardization and strategy is because
Child (1977) has suggested a negative association between organizational centralization and standardization and he proposed these are two ways for organizational control. That is, when organization becomes more standardized and then better controlled, it is possible for senior managers to give more decision making rights to lower and middle level managers. Thus, since ‘Prospector’ organization demands a more decentralized structure, it will have to standardize its working practices accordingly.

A bivariate correlation was conducted to test the strength of the relationship between strategy and standardization, and the results have been presented in Table 6.3. It can be seen that there are significant correlations between strategy and two standardization constructs. More specifically, the positive correlation between organizational strategy and the two standardization variables indicate that the closer the organizational strategy is to the ‘Prospector’ type, the more standardized will become an organization’s formal rules and regulations, as well as its ‘informal codes of conduct’. These results provide significant evidence in support of the hypothesis 1b and suggest that to decentralize its organizational structure, an organization will have to simultaneously standardize it working practices in order to keep control on the whole organization.

It is always advisable when undertaking correlations to examine the data graphically, by producing a scatter plot (Hair et al, 1997). As can be seen from the scatter plots presented in figures 6.2 & 6.3, there is a clear positive relationship between strategy and the degree of standardization. Whilst scatter plots were used to help interpret and validate all of the correlations, in the interests of saving space, only the scatter plots for strategy and standardisation have been printed in the thesis, as they provide good examples of the approach.

**Table 6.3: Correlation Results: Strategy and Standardization**

<table>
<thead>
<tr>
<th>Hypothesis 1b</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal Code of Conduct</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
<tr>
<td>Formal Standardization</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.001 level (2-tailed).**

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

**Correlation is significant at the 0.05 level (2-tailed).**
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Figure 6.2: Scatter plot and regression line for formal standardization and strategy

Figure 6.3: Scatter plot and regression line for informal standardization and strategy
It can be concluded as far as the quantitative data is concerned, standardization is significantly and positively related with organizational strategy as hypothesized, which means standardization is led and influenced by organizational strategy. In conclusion, these findings provide important evidence in support of the hypothesis 1b.

6.3.3 Strategy and Centralization

Centralization is the most common element adopted in previous studies of the relationship between IT and organizational structure (Argures 1999; Travica 1995; Zeffane 1989). As Miles and Snow (1978) have argued that ‘Prospector’ organizations will adopt a more decentralized structure in order to better cope with market conditions. It was hypothesized that organizations that pursue the archetypal ‘Prospector’ strategy are likely to adopt flatter organizational structures, with an extended span of control.

Table 6.4 presents the result of the correlation analysis that was conducted to test the strength of the relationship between the centralization and strategy constructs. It can be seen that the bivariate correlation identifies a significant and negative association between organization strategy and centralization. This means the closer the organizational strategy is to the ‘Prospector’ type, the more likely it is that the organization will decentralize its decision making rights. The results provide important new empirical support for previous theoretical contributions which have argued that a highly centralized organization is appropriate for organizations operating in a stable environment (Pfeffer 1982; Fincham and Rhodes 1999), because it is not necessary for the organization to seek more flexibility in this kind of environment. For the company operating in a stable environment, what counts is production efficiency (Perrow 1986; Meyer 1992; Child and McGrath 2001). By contrast, as ‘Prospector’ organizations will commonly need to be flexible in responding to environmental change (Miles and Snow 1978), they will have to decentralize their decision making in order to effectively cope with their organizational environment (Perrow 1986; Meyer 1992; Dibrell and Miller 2002).
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Table 6.4: Correlation Results: Strategy and Centralization

<table>
<thead>
<tr>
<th>Hypothesis 1c</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralization</td>
<td>0.16*</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.05</td>
</tr>
<tr>
<td>Significance (2-tailed)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

In summary, the correlation analysis provides important statistical support for hypothesis 1c that proposes a negative association between organizational centralization of organizational decision making with the organizational strategy. The result here also supports Miles and Snow (1984), who argued that compared with the ‘Defender’ strategy adopters, the ‘Prospector’ organizations commonly adopt a more decentralized organizational structure.

In addition to above analysis, T tests that compared the means of the centralization construct between ‘Prospector’ organizations and ‘Defender’ organizations were conducted, and it confirms and reinforces the results of correlation analysis. Indeed, it should be noted that T tests were conducted to further explore the differences between the ‘Defender’ and ‘Prospector’ clusters, in all of the hypotheses that involved the strategy construct. However, whilst these analyses were important in that they provided additional statistical evidence to support the results of the correlation analyses, they didn’t provide any new insights. Consequently, the results of the remainder of these analyses have been included in Appendix VII, but will not be discussed in any further detail, in the body of this thesis.

6.3.4 Strategy and Horizontal Integration

Miles and Snow (1978) suggest that the ‘Prospector’ strategy adopter will be characterized by better coordinated interdepartmental relationships. Accordingly, it was hypothesized that the closer the organizational strategy is to the ‘Prospector’ type, the stronger will be the degree of horizontal coordination.

To test the strength of this relationship, a bivariate correlation analysis was conducted. It can be seen from the results, presented in Table 6.5, that nearly all
Chapter 6—Quantitative Data Analysis

Table 6.4: Correlation Results: Strategy and Centralization

<table>
<thead>
<tr>
<th>Hypothesis 1_c</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralization</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

In summary, the correlation analysis provides important statistical support for hypothesis 1_c that proposes a negative association between organizational centralization of organizational decision making with the organizational strategy. The result here also supports Miles and Snow (1984), who argued that compared with the 'Defender' strategy adopters, the 'Prospector' organizations commonly adopt a more decentralized organizational structure.

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To test the strength of this relationship, a bivariate correlation analysis was conducted. It can be seen from the results, presented in Table 6.5, that nearly all
measures of horizontal integration show significant correlations with organizational strategy. The positive association between the 'Prospector' strategy, with 'Effective Inter-departmental communication', suggests that 'Prospector' organizations are more likely to encourage interdepartmental communication, which enables better coordination among departments (Parente et al 2002). However, the significance of the correlation between strategy and 'strong departmental boundaries', at 0.10, is fairly weak. This might suggest while strategy doesn't significantly influence this variable, as strongly as it does other horizontal integration variables, it does still exert some affect on the departmental boundaries. More specifically, the negative association shows that 'Prospector' organizations are more likely to have taken steps to reduce any barriers to interdepartmental coordination.

Table 6.5: Correlation Results: Strategy and Horizontal Integration

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Correlation</th>
<th>Significance (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Inter-Departmental Communication</td>
<td>0.21**</td>
<td>0.01</td>
</tr>
<tr>
<td>Strong Departmental Boundaries</td>
<td>-0.13</td>
<td>0.10</td>
</tr>
<tr>
<td>Shared Corporate Objectives</td>
<td>0.22**</td>
<td>0.01</td>
</tr>
<tr>
<td>Tense Departmental Relationships</td>
<td>-0.21**</td>
<td>0.01</td>
</tr>
<tr>
<td>Informal Communication Channels</td>
<td>0.30***</td>
<td>0</td>
</tr>
</tbody>
</table>

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

At the same time, the quantitative data analysis suggests that the 'Prospector' organization is more likely to encourage the 'shared co-objective' between its different departments. This should ultimately contribute to better interdepartmental coordination and cooperation, and consequently enable organizations to better serve their markets and customers (Parente et al 2002). The significant and
negative association between strategy and 'Tense Departmental Relationships' suggests that 'Prospector' organizations are less likely to experience an unfavorable interdepartmental relationships, which should enable them to improve their interdepartmental coordination (Galbraith 1994). Finally, the 'informal communication channels' are also important for the 'Prospector' organization, as shown by the quantitative data analysis. This suggests that the 'Prospector' organizations are more likely to adopt informal channels to cope with any organizational change (Fincham and Rhodes 1999; Burns and Stalker 1968).

The significant associations suggest that the closer the organizational strategy is to 'Prospector' strategy, the more likely it is that there will be strong horizontal integration and effective interdepartmental relationships, as measured by the all five item measures.

In their totality, these results provide important new empirical data in support of Miles and Snow's (1978) work, which emphasizes that the 'Prospector' organization, as compared with the 'Defender' organization, will commonly pay far more attention to its inter-departmental relationships, in order to better coordinate its work. More recently, Davenport (2000) has pointed out that in today's business environment, all companies need to place more attention on the horizontal relationships, so that they have the flexibility to cope with environmental change, such as globalization, and effectively and efficiently get their job done (Amrani et al 2006).

In sum, the result of these correlation analyses conducted in this section found significant relationships between all interdepartmental variables with organizational strategy. Consequently, analyses in this section lend strong support for the hypotheses 1d.

6.3.5 Summary

In this section the hypothesized relationships between organizational strategy and structural variables have been thoroughly analyzed through the use of correlation analysis and T tests. It has been found that strategy is statistically related to the all of the structural variables. Thus in general, these results confirm the hypothesized associations between strategy and all of the structural variables, which to a large extent provides important new empirical evidence in support of Miles and Snow's original work (1978). These support the hypotheses and suggest that the
'Prospector' organizations will adopt an organizational structure that is flatter, more decentralized, more standardized and enjoys better interdepartmental relationships. In their totality, these structural characteristics should enable the 'Prospector' organizations to be more flexible and responsive (Miles and Snow 1978; Segars 2002). In the next section, the relationship between strategy and ERP will be tested to explain how strategy could also influence the physical arrangement of an ERP implementation.

6.4 Strategy and ERP

Few empirical studies, if any, have been done with the express purpose of exploring the relationship between strategy and ERP. In accordance with the contingency theory and the 'Seven Ss' framework (Lynch 2000), it has been hypothesized in this study, that there is likely to be a strong association between ERP and strategy, as illustrated by Figure 6.4. In order to test the existence and the strength of this association, a thorough quantitative analysis, based upon bivariate correlation analysis and Chi square test, has been undertaken.

Figure 6.4: Strategy and ERP

Firstly, Chi Square test, that is regard as the quantitative technique for the categorical data (Hair et al 1998), has been carried out in order to see how strategy influences on the decision with respect to ERP adoption. As it can be seen in Table 6.6, the significance of this test is greater than 0.1 and thus the relationship is non-significant. At the same time, it can be seen that there are no significant differences between the expected values and the counted values, which means that the differences are not due to the inherent relationship between strategy and ERP existence. Therefore the hypothesis 1a is not upheld here and should be discussed further in research findings.
Table 6.6: Chi Square Test

<table>
<thead>
<tr>
<th>Hypothesis 2</th>
<th>Prospector</th>
<th>Defender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP Adopter</td>
<td>86 (83.2)</td>
<td>36 (38.8)</td>
<td>122</td>
</tr>
<tr>
<td>Non-ERP Adopter</td>
<td>19 (21.8)</td>
<td>13 (10.2)</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>49</td>
<td>154</td>
</tr>
</tbody>
</table>

Df=1 and X²=1.44, the significance is 0.23

It can be seen, from the correlations table [See Table 6.7], that 'ERP coverage' is not significantly and positively associated with organizational strategy. This suggests that the organizational strategy doesn’t have significant influences on ERP. At the same time, the association between ERP authorization and strategy was not significant at the 5% level. This means that organizational strategy has no obvious influence on how the ERP adopters will control the usage of their ERP system. The possible explanation for this result might be that in China context, ERP adoption and its physical scale have been influenced by other factors, which will be discussed in Chapter 7 through the qualitative data.

Table 6.7: Correlation Results: Strategy and ERP

<table>
<thead>
<tr>
<th>Hypothesis 2</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP Scale</td>
<td></td>
</tr>
<tr>
<td>ERP Coverage</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>0.10</td>
</tr>
<tr>
<td>ERP Authorization</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>-0.11</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>ERP Benefits</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>0.38***</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Operational Benefits</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>0.31***</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.001 level (2-tailed).
* Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
By contrast, the correlation analyses detected significant and positive associations between organizational strategy and ERP benefit variables, which suggest that a 'Prospector' organization might be able to gain more benefits, resulting from the ERP adoption. This is probably due to the fact that 'Prospector' organization will be more likely to commit itself to successful implementing ERP system with the purpose of reinforcing their strategic objectives.

In sum, the quantitative analyses in this section provided only partial support for hypothesis 2, as significant associations have only been detected between organizational strategy and ERP benefits, but not between organizational strategy and ERP scope.

6.5 ERP and Structure

The section aims to critically review the influences of ERP deployment on a range of organizational structural dimensions, namely configuration, centralization, standardization and interdepartmental relationship, as illustrated in Figure 6.5. It was hypothesized, in Chapter three, that the adoption of ERP will result in a flatter, more decentralized, more standardized and better horizontally integrated organizational structure. As the influence of IT upon organizational structure has attracted significant interest over the past years, but little explicit empirical evaluation of the impact of ERP on organizational structure has been conducted, this relationship will form the core of this study.

Figure 6.5: Hypothesized Relationship between ERP and Structure

6.5.1 ERP and Configuration

It has been hypothesized [H3a] that the deployment of ERP should allow the host
organization to flatten its structure, and in so doing, extend its span of control. To test this relationship between configuration and ERP, bivariate correlation analysis was carried out, the results of which can be seen in Table 6.8. It can be seen that no significant association has been detected between 'ERP Coverage' and the three configuration variables. This result suggests that an ERP system's physical arrangement, in terms of the scope of its functionality and the extent of its organizational diffusion, has no obvious impact on organizational configuration. This is an interesting result, as it suggests that simply spreading the technology widely throughout the organization is unlikely to engender measurable modifications to an organization's configuration. Whilst this result runs counter to the original hypothesis, it is also important to explore whether there are significant associations between the ERP authorization and benefits variables and organizational configuration.

Table 6.8: Correlation Results: ERP and Configuration

<table>
<thead>
<tr>
<th>Hypothesis 3a</th>
<th>ERP Scale</th>
<th>ERP Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coverage</td>
<td>Authorization</td>
</tr>
<tr>
<td>Number of Subordinates</td>
<td>Correlation</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>Significance</td>
<td>0.46</td>
</tr>
<tr>
<td>Hierarchy Levels</td>
<td>Correlation</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>Significance</td>
<td>0.34</td>
</tr>
<tr>
<td>Effort to reduce the span of Control</td>
<td>Correlation</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Significance</td>
<td>0.68</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The statistical analysis provides some important insights into how the degree of authorization required for ERP usage might impact organizational configuration. For example, the 'ERP authorization' is found to be significantly associated with 'hierarchical levels' - that is, in organizations where users are allowed to freely use the ERP system, the hierarchy tends to be distinctly flatter. Furthermore, the degree of 'ERP authorization' was found to have a negative association with the 'effort to reduce span of control'. This result suggests that when users are encouraged to
freely use their ERP systems, and in so doing probably work more efficiently, senior managers may see the possibility of downsizing, and thereby reducing the span of control.

Whilst there was no discernable relationship between the 'ERP scale' construct and organizational configuration, the two major ERP benefits constructs - 'operational benefits' and 'informational benefits' - appear to have a far more obvious impact upon organizational configuration. For example, the negative associations between 'hierarchical level' and ERP benefits suggest that the greater the benefits that have been realized through an ERP project, the fewer will be the levels of organizational hierarchy. A plausible interpretation of this result might be that a successful ERP implementation can help an organization to more effectively manage its workforce, and thereby flatten the organizational hierarchy by removing redundant layers of management. Based upon this analysis, it would be reasonable to expect that there would also be significant and positive associations between ERP benefits and the 'number of subordinates' controlled by one manager. Unfortunately, whilst there is a positive, and mildly significant, association between 'ERP benefits' and 'number of subordinates', this result does not quite meet the critical significance level of 5%. Consequently, a reasonable interpretation of these results would be that as the successful introduction ERP has a more significant impact on the flatness of the organization, than it does on the span of control, then it may be that as successful ERP adopters are flattening their structures they are also seeking to slim down their workforce, at the same time. However, what does seem clear from these results, is that the successful ERP adoption allows its powerful information processing and communications capability (Kumar and Van Hillegersberg 2000) to be realized, which allows managers to make decisions, monitor staff, and communicate decisions more efficiently and effectively (Galbraith 1977; Pinsonneault and Kraemer 1993a).

Finally, a significant and positive association has been identified between 'efforts to reduce the span of control' and the successful realization of 'ERP operational benefits'. Whilst this might seem to run counter to the previous results, one reasonable interpretation of this result might be that whilst ERP has allowed organizations to flatten their structures, and increase their spans of control, they also envisage that ERP might have the potential to fully automate some processes, thereby facilitating downsizing and potentially reducing to the span of control (Hall
Together, these results suggest that although ERP coverage doesn't have a significant impact upon an organization's configuration, the realization of benefits does have a positive impact. More specifically, the successful adoption of ERP does appear to facilitate the flattening of the structure and a modest reduction in the span of control. Consequently, whilst it is not possible to say that hypothesis 3a is fully endorsed, there is some important supportive evidence that will need to be further explored and corroborated through the qualitative research.

6.5.2 ERP and Standardization

Although there has been a paucity of field studies exploring how ERP will influence organizational standardization, it was hypothesized in this study that ERP adoption will result in a more standardized organizational structure. This is because ERP is a process-oriented technology (Clemmons and Simon 2001; Murphy and Simon 2002) and it is designed to integrate the whole organization together (Davenport 2000b). Thus, organizations will need to standardize their working practices in order to match the ERP requirements (Hall 2000).

In terms of the strength of the relationship between ERP and standardization, the bivariate correlation analysis [Refer to Table 6.9] suggests that there are significant associations, between 'ERP coverage' and the resultant degree of 'formal standardization'. This implies that the greater the scope of the ERP coverage, the more standardized will be its working practices, across the organization. Furthermore, it was found that there is significant association between the degree of 'informal standardization' and the 'ERP coverage', which might suggest that the wider the ERP coverage, the more likely it will be that informal rules or regulations will arise to cover those areas that have not been formally standardized, through the adoption of ERP. The results here are, provide important empirical support for past studies, which argued that ERP implementations should require the close alignment of organizational working practices with ERP embedded practices (Hall 2002).
Table 6.9: Correlation Results: ERP and Standardization

<table>
<thead>
<tr>
<th>Hypothesis 3b</th>
<th>ERP Scale</th>
<th>ERP Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coverage</td>
<td>Authorization</td>
</tr>
<tr>
<td>Formal</td>
<td>Correlation</td>
<td>0.23**</td>
</tr>
<tr>
<td>Standardization</td>
<td>Significance (2-tailed)</td>
<td>0.01</td>
</tr>
<tr>
<td>Informal</td>
<td>Correlation</td>
<td>0.21*</td>
</tr>
<tr>
<td>Codes</td>
<td>Significance (2-tailed)</td>
<td>0.02</td>
</tr>
<tr>
<td>of Conduct</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

In stark contrast to the strong relationship found between ERP coverage and the level of standardization, no significant association was found between 'ERP authorization' and organizational standardization variables, which suggests that the control of usage of ERP has no direct influence on organizational standardization since the control of the usage of ERP has no direct relationship with the rules and regulations of working practices.

Finally, very significant associations have been found between 'ERP benefits' and 'formal standardization', which suggests that it only once an ERP implementation is operating effectively that it will have the focused information necessary to co-ordinate its operations and in so doing, standardize its working practices. Paradoxically, no significant relationships were found between the 'ERP benefits' and the emergence of 'informal rules', but one plausible interpretation of this result might be that once an ERP is operating effectively, in an enterprise-wide manner, there is less need for informal codes of conduct.

In sum, it has been demonstrated, through correlation analyses, that there are significant associations between ERP, benefits and scale, with the resultant degree of work standardization, particularly as evidenced through the adoption of formal rules and regulations. More specifically, it has been found that the wider the scale and scope of the ERP system, and the greater the benefits realized through its implementation, the more likely it will be that the organization will enact its practices,
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processes and procedures in a standardized manner. Consequently, these results provide important support for hypothesis 3b.

6.5.3 ERP and Centralization

This subsection aims to explore the influence of the adoption of ERP on the degree of organizational centralization. It was hypothesized [H3b], in this study, that the scale of the ERP implementation and the level of benefits realized would both be positively associated with the degree of organizational decentralization. Correlation analysis has been employed, once more, to explore the degree of association between ERP implementation and the level of organizational centralization. As illustrated by Table 6.10, significant associations have found between ‘ERP coverage’, ‘ERP authorization’ and ‘ERP operational benefits’ and the resultant level of ‘organizational centralization’.

Table 6.10: Correlation Results: ERP and Centralization

<table>
<thead>
<tr>
<th>Hypothesis 3c</th>
<th>ERP Scale</th>
<th>ERP Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralization</td>
<td>Correlation</td>
<td>Coverage</td>
</tr>
<tr>
<td></td>
<td>-0.22*</td>
<td>0.18*</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The significant, negative association between ‘ERP Coverage’ and ‘organizational centralization’ suggests, unlike configuration variables, organizational centralization can be directly influenced by the extent of an ERP system’s physical coverage. This might suggest that the widespread adoption of ERP will improve the distribution of information, which should allow more junior managers and other system users to make more of their own decisions, without having recourse to senior management authorization. At the same time, a positive association, which has been found between organizational ‘centralization’ and ‘ERP authorization’, provides some important evidence in support of the previous result, but from a different perspective.
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As 'ERP authorization' represents the degree to which an ERP adopter restricts the ERP usage, if an organization freely allows users to access and use its ERP implementation, then this will help it to promote a more decentralized decision-making structure. Together, these results suggest that the implementation of large scale and widely available ERP system, can help organizations to provide high quality information across the entire enterprise, which should facilitate the decentralization their decision making, and empowerment their staff (Pfeffer and Leblebici 1977; Swanson 1987; Fincham and Rhodes 1999; Dibrell and Miller 2002).

When exploring the importance and influence of a successful ERP implementation on centralization, the negative association suggests that the more operational benefits are realized from ERP implementation, the more likely it will be that the organization decentralizes its decision making. This might suggest that since the daily operation of the organization can be easily dealt with by virtue of successful ERP implementation, lower level staff can also make decisions that they can't enjoy before the adoption of ERP. Whilst the relationship between 'ERP informational benefits' and 'organizational centralization' aren't quite significant, at the 5% level, they do provide some added reassurance that to have an impact upon organizational structure, an ERP implementation must be successful.

In sum, it has been found that an ERP system, which has been successfully deployed and is both widely and freely available should help to decentralize the decision-making process, by empowering more staff to make their own decisions. Consequently, the analysis in this subsection provides strong support for hypothesis 3c, which means that it can be safely accepted.

6.5.4 ERP and Horizontal Integration

In their study, Koch and Buhl (2001) studied how team working was influenced by ERP adoption, through a series of case studies. They found that teams working across departments was not reinforced though ERP adoption. This suggested that ERP systems, to a large extent, have failed to realize their potential for interdepartmental coordination and cooperation, as previously hypothesized by Davenport (2000). Therefore, in this study, quantitative methods were adopted in order to revisit this relationship, in the context of ERP adoption amongst Chinese manufacturing companies. To test the hypothesized relationship between the
adoption of ERP and the degree of horizontal integration, bivariate correlation was carried out, the results of which have been presented in Table 6.11 [Next page].

The relationships between ERP scale variables with horizontal integration variables were firstly explored. It was perhaps surprising that no significant associations were found between the 'scale of ERP' implementations and the resultant level of 'horizontal integration'. This suggests that no matter how widely the ERP might spread and used across the whole organization, it doesn't exert any obvious or measurable influence on the level of integration or interaction between organizational departments, teams or work units.

By contrast, although there was no significant association between the ERP scale variables and the horizontal integration variables, the successful adoption of ERP does appear to affect some aspects of interdepartmental relationships. It can be seen that 'ERP benefits' are significantly associated with the degree which 'objectives are shared across departments'. This might suggest that the greater the success of an ERP project, the more likely it will be that the staff from different departments would come to share the same objectives. The reason for this might be that the increased volume and quality of the information that was successfully communicated through the ERP system will help the different departments to work together towards shared organizational objectives. At the same time, it has been found that there is a significant and negative association between 'ERP informational benefits' and 'tense departmental relationship', and a positive association between 'ERP benefits' and the 'informal communication channels'. All of these suggest that the attainment of ERP benefits can potentially reduce interdepartmental tension and encourage organizations to build more effective communication channels, which help to facilitate constructive inter-departmental relationships.
### Table 6.11: Correlation Results: ERP & Horizontal Relationship

<table>
<thead>
<tr>
<th>Hypothesis 3d</th>
<th>ERP Scale</th>
<th>ERP Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coverage</td>
<td>Authorization</td>
</tr>
<tr>
<td>Effective Inter-Departmental</td>
<td>Correlation</td>
<td>-0.04</td>
</tr>
<tr>
<td>Communication</td>
<td>Significance (2-tailed)</td>
<td>0.70</td>
</tr>
<tr>
<td>Strong Departmental Boundaries</td>
<td>Correlation</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.73</td>
</tr>
<tr>
<td>Shared Corporate Objectives</td>
<td>Correlation</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.82</td>
</tr>
<tr>
<td>Tense Departmental Relationships</td>
<td>Correlation</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.77</td>
</tr>
<tr>
<td>Informal Communication Channels</td>
<td>Correlation</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.08</td>
</tr>
</tbody>
</table>

** ** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

However, it is important to note that no significant associations were found between the ERP benefits variables with two other important aspects of horizontal integration, namely the ‘effective interdepartmental communication’ and ‘strong departmental boundaries’. These might suggest that although the successful adoption of ERP is capable of facilitating improved horizontal integration indirectly by reducing departmental tension, improving informal communication and encouraging shared objectives, it has less of an effect on the more tangible elements of horizontal integration, namely breaking down departmental boundaries and improving interdepartmental communication.

Thus in this subsection, the correlation between ERP and the horizontal relationship variables were tested. This analysis has found significant associations between
ERP benefits and three of the horizontal relationship variables. Consequently, the results of the correlation analyses provide only partial support for hypothesis 3d. Consequently, the qualitative data will play an important role in helping to find the possible explanations and interpretations for these inconclusive results. However, what is very interesting to note from this analysis is that it is the effectiveness, once more, rather than the scale, of an ERP implementation, that is most likely to facilitate more effective horizontal relationships.

6.5.5 The Impact of ERP Adoption on Structure

Having reviewed the impact of ERP scale and success on organizational structure, using correlation analysis, it was also important to investigate how the mere presence of an ERP implementation might impact the structural design. That is to say do the organizations that have already implemented ERP have measurably different organizational structures to those who haven't. To this end, t tests were employed with the purpose of providing insights into how the organizational structures of ERP adopters and Non-ERP adopter might differ. The results of this analysis are presented in Table 6.12. Although it can be seen, that significant differences are apparent, between ERP adopters and non-adopters, in a number of areas, there doesn't appear to be any widespread effect, nor is the effect consistent.
Table 6.12: Structural Differences between ERP Adopters and Non-adopters

<table>
<thead>
<tr>
<th>Structural Dimensions</th>
<th>Group</th>
<th>Mean</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchical Levels</td>
<td>ERP Adopter</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.4</td>
<td>2.11*</td>
<td>0.04</td>
</tr>
<tr>
<td>No. of Subordinates</td>
<td>ERP Adopter</td>
<td>4.6</td>
<td>1.75</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort to Reduce Span of Control</td>
<td>ERP Adopter</td>
<td>3.9</td>
<td>0.40</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centralization</td>
<td>ERP Adopter</td>
<td>4.7</td>
<td>-0.08</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Code of Conduct</td>
<td>ERP Adopter</td>
<td>5.2</td>
<td>1.28</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal Standardization</td>
<td>ERP Adopter</td>
<td>5.1</td>
<td>3.19**</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Inter-Departmental Communication</td>
<td>ERP Adopter</td>
<td>5.3</td>
<td>2.16*</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong Departmental Boundaries</td>
<td>ERP Adopter</td>
<td>4.1</td>
<td>-0.96</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Corporate Objectives</td>
<td>ERP Adopter</td>
<td>5.4</td>
<td>2.95**</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tense Departmental Relationships</td>
<td>ERP Adopter</td>
<td>5.4</td>
<td>-0.38</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Communication Channels</td>
<td>ERP Adopter</td>
<td>4.7</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>Non-ERP Adopter</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Significant differences have been found for some structural dimensions, which help to reinforce several of the hypotheses, namely ‘Formal Standardization’ [H3c], ‘Effective Inter-departmental Communication’ [H3d] and ‘Share Corporate Objectives’ [H3d]. These three results suggest that the basic adoption of ERP, irrespective of its scale or success, can engender some changes to the organizational structure of ERP adopters. More specifically, the fact that the mere adoption of ERP can help organizations to standardize their working practices; is not perhaps surprising as process formalization is at the heart of the ERP philosophy (Davenport 2000b). Moreover, ERP adoption can improve horizontal
relationships by providing better and more frequent information, to facilitate effective inter-departmental communications and help to strengthen the sharing of corporate objectives.

In another case significant differences have been found that appear to run counter to the correlation analysis. More specifically, in the case of ‘hierarchical levels’, the analysis suggests that companies that have adopted ERP might have more hierarchical levels than those companies that have not implemented ERP. Whilst this result might suggest that ERP steepens the organizational structure, a more reasonable interpretation might be that as it is generally larger companies that have adopted ERP in China, they still tend to have more structural layers than the smaller organizations, who have not as yet adopted ERP. Finally, for other critical structural dimensions, namely the centralization construct, and the other three horizontal integration variables, no significant differences have been found. However, it should be noted that although the adoption of ERP isn't having a statistically significant impact on centralization, there is evidence of a weak influence, with a P value of 0.94.

In summary, the use of the T tests, to investigate the structural differences between ERP adopters and non-adopters has been interesting, in that it highlights a subtly different set of structural impacts than was discovered through the application of correlation analysis, to explore the effects of ERP coverage and success on organizational structure. In doing so, these results provide important new evidence in support of hypothesis H3c and they may also help to reinforce hypotheses H3b and H3d, but they may also rather weaken hypothesis H3a. Consequently, it will be important to use the qualitative data, as presented in chapter 7, to help further explore and interpret these results.

6.5.6 Summary

It can be concluded from the above analyses, that there are strong associations between many structural variables and ERP variables. But it is important to emphasize that these ‘strong associations’ are not particularly evenly distributed throughout the analyses: different dimensions of structure are related with different aspects of ERP. For example, the configuration of organization is influenced by ERP benefits, but not by the ERP scale. By contrast, the degree of centralization is influenced by both the scale of ERP coverage and the ERP operational benefits.
Similarly, the organizational standardization is influenced by both ERP scale and benefits. Finally, the degree of horizontal integration doesn’t appear to be associated with the ERP variables, in any uniform manner. The attainment of ERP benefits appears to affect some integration variables, but not others, whilst ERP coverage has no discernable impact upon the level of integration. These results, to a greater or lesser extent, provide some support to all of the hypotheses and suggest that the larger the ERP scale and the more benefits were gained through the ERP projects, the more likely it will be that the organization will flatten its hierarchy; the information and operation benefits also help organizations standardize their practices; the better informed organizational top management thus can decentralize more decision rights.

Some interesting inferences can also be made by comparing the impact of ERP adoption, ERP coverage and ERP success on organizational structure. For example, the results of the T tests, presented in the previous subsection, suggest that mere adoption of ERP may only have a modest impact on organizational structure. By contrast, ERP coverage is found to be significantly associated with organizational centralization and standardization. Finally, and most importantly, the realization of ERP benefits has been found to have the most significant and consistent influence on the dimensions of organizational structure. This is a particularly important result, as it suggests that simply adopting ERP and rolling it out across the organization, will have less influence on organizational structure, than can be effected by successful utilizing ERP technology, to the extent that it delivers clear and measurable benefits. Given the potential importance of this result, it will be far more fully reviewed and interpreted in chapters 7 and 8.

6.6 Structure and Flexibility

This section aims to explore the influence of organizational structure on organizational flexibility. By so doing, this study is able to find whether the design of an organization’s structure can influence the degree of flexibility demanded by organizational strategy. The degree of organizational flexibility has been hypothesized to be influenced by an organization’s structural design, as illustrated by Figure 6.6. To quantitatively explore the nature of the relationship between ERP and structure, bivariate correlation analysis has been employed.
Chapter 6—Quantitative Data Analysis

Figure 6.6: Structure and Flexibility

6.6.1 Configuration and Flexibility

As presented in Table 6.13, it can be seen that there is a significant association between ‘efforts to reduce the number of subordinates’ controlled by one manager and the level of ‘organizational flexibility’, which might suggest that the effort to reduce the span of control can lead to more organizational flexibility, since managers can better monitor and supervise smaller number of subordinates. At the same time, there is also a significant and negative association between ‘hierarchy levels’ and the resultant level of ‘organizational flexibility’. This suggests that an organization with a flatter structure will enjoy more organizational flexibility. This is largely due to the reduced information relay layers, which can enable organization to respond to environment quickly (Child 1984; Dibrell and Miller 2002).

Table 6.13: Correlation Results: Configuration and Flexibility

<table>
<thead>
<tr>
<th>Hypothesis 4a</th>
<th>Number of subordinates</th>
<th>Effort to reduce span of control</th>
<th>Levels of Hierarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Flexibility</td>
<td>Correlation</td>
<td>0.07</td>
<td>0.23**</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.39</td>
<td>0.004</td>
</tr>
<tr>
<td>Production Flexibility</td>
<td>Correlation</td>
<td>-0.05</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed)</td>
<td>0.59</td>
<td>0.62</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
At the same time, no significant association has been detected between production flexibility and configuration variables, which might suggest that production flexibility can't be significantly influenced by the configuration variables, which are not so closely linked with production department. Instead, the result here probably implies that it is the manufacturing technologies and techniques that count for the production flexibility.

In sum, the quantitative data analyses provide empirical support that organizations which are seeking to reduce their size and have a flatter organizational hierarchy can enjoy greater organizational flexibility, but not production flexibility. As argued in Chapter Two, this study originally attempted to subsume the production flexibility under organizational flexibility. But the quantitative result reinforces the fact that production flexibility is very distinct from organizational flexibility. Therefore, the result provides partial support for hypothesis 4a, which hypothesized that the adoption of ERP will lead to greater organizational flexibility, but only in the case of organizational flexibility.

6.6.2 Standardization and Flexibility

The correlation analyses for the standardization and flexibility constructs are to be found overleaf in Table 6.14. Similar to the relation between configuration and flexibility, significant associations have been found between 'formal standardization' and 'organizational flexibility', but not 'production flexibility', which lends some support to hypothesis 4b, and suggests that the more standardized the organization is, the more flexibility can be enjoyed by the organization. The results here might suggest that highly standardized organizations can be more responsive and flexible. This is probably due to the reason that formal rules and regulations can help organizations to coordinate different part of their activities and thus gain more flexibility (Galbraith 1975; Kallinikos 2004b). By contrast, the informal codes of practice were not found to be significantly associated with either of the flexibility variables, which might suggest that the unwritten rules and regulations don't have so much influence on the staff's capability in dealing with changes. Thus, the results provide modest statistical support that standardization does have an influence on organizational flexibility but not production flexibility.
Table 6.14: Correlation Results: Standardization and Flexibility

<table>
<thead>
<tr>
<th>Hypothesis 4b</th>
<th>Informal Code of Conduct</th>
<th>Formal Standardization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Flexibility</strong></td>
<td>Correlation: -0.01</td>
<td>0.20*</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed): 0.94</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Production Flexibility</strong></td>
<td>Correlation: -0.03</td>
<td>-0.13</td>
</tr>
<tr>
<td></td>
<td>Significance (2-tailed): 0.72</td>
<td>0.12</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.6.3 Centralization and Flexibility

According to the correlation analysis as presented in Table 6.15, there is significant association between ‘organizational flexibility’ and ‘centralization’. This suggests that the more decentralized the organization is, the more organizational flexibility will be enjoyed by that organization, as previously hypothesized by Galbraith and Nathanson (1978), Pfeffer (1978) and Englehardt and Simmons (2002). However, the degree of centralization does not have any significant association with the degree of production flexibility. The explanation for this might be that production flexibility can only be significantly influenced by the manufacturing technologies and techniques, rather than the organizational structure. Therefore, above results suggested that a more decentralized organizational strategy can enable organizations to better cope with the emerging markets and external pressures, and thus to be more flexible in deal with organizationally related changes. In sum, the findings here lend some support for hypothesis 4c, under the assumption that production flexibility is to be separated from the organizational flexibility.
Table 6.15: Correlation Results: Centralization and Flexibility

<table>
<thead>
<tr>
<th>Hypothesis 4c</th>
<th>Centralization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Flexibility</strong></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td>-0.18*</td>
</tr>
<tr>
<td>Significance (2-tailed)</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Production Flexibility</strong></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td>0.13</td>
</tr>
<tr>
<td>Significance (2-tailed)</td>
<td>0.12</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).  
** Correlation is significant at the 0.01 level (2-tailed).  
* Correlation is significant at the 0.05 level (2-tailed).

6.6.4 Horizontal Integration and Flexibility

The correlation analysis suggests, as shown in Table 6.16, that there are significant associations between three interdepartmental relationship variables and 'organizational flexibility', while the significance of the associations between 'effective Inter-departmental communication' and 'strong departmental boundaries' and 'organizational flexibility' are 0.09 and 0.1, which might also suggest some inherent relationship between these other two horizontal integration variables and 'organizational flexibility'; and there is also a significant association between 'production flexibility' and 'strong departmental boundaries'. The positive associations between horizontal relationship variables with the 'organizational flexibility' imply that when the component parts of the organization are working together in a coordinated and harmonious form, then it will be far easier to realize organizational flexibility. In addition, the significant negative association between 'strong departmental boundaries' and 'production flexibility' might suggest that interdepartmental boundaries can exert negative influences on the capability of the production department to communicate effectively with other functional areas, thus delaying changes of production processes and order specifications. In summary, hypothesis H4d is upheld by the findings in this subsection, but mainly in relation to the organizational flexibility, and far less so for production flexibility.
### Table 6.16: Correlation Results: Horizontal Relationship & Flexibility

<table>
<thead>
<tr>
<th>Hypothesis 4&lt;sub&gt;d&lt;/sub&gt;</th>
<th>Organization Flexibility</th>
<th>Production Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correlation</td>
<td>Significance (2-tailed)</td>
</tr>
<tr>
<td>Effective Inter-Departmental Communication</td>
<td>0.13</td>
<td>0.10</td>
</tr>
<tr>
<td>Strong Departmental Boundaries</td>
<td>-0.14</td>
<td>0.09</td>
</tr>
<tr>
<td>Shared Corporate Objectives</td>
<td>0.24**</td>
<td>0.003</td>
</tr>
<tr>
<td>Tense Departmental Relationships</td>
<td>-0.16*</td>
<td>0.05</td>
</tr>
<tr>
<td>Informal Communication Channels</td>
<td>0.20**</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

#### 6.6.5 Summary

In this section, the relationships between the structural dimensions and the two flexibility constructs were explored through the use of correlation analysis. The results of the correlation analyses provided important new evidence, which provided partial support for most of the hypotheses. The confirmed hypotheses proposed that a flatter and more tightly integrated organization which is also more decentralized and standardized, can enjoy a higher degree of flexibility.

However, the quantitative data analyses, in this section, also indicate that whilst organizational structure has significant influences on organizational flexibility, its influences on production flexibility are at best limited. This might be due to the fact that organizational structure is about the arrangement of the whole organization and thus has limited influences on the flexibility of production department. Instead, Fitzgerald and Siddiqui (2002) clearly suggested that while production flexibility can greatly contribute to an organization's strategic flexibility, it is only part of organizational flexibility and is significantly influenced by manufacturing technologies and techniques. The result of the quantitative analyses in this section provides new insight into the relationship between organizational structure and production flexibility, because, although there have been large amount of studies linking the organizational flexibility with organizational structure, few empirical works
have been carried out to explore the influences of organizational structure on production flexibility.

In sum, the findings of this subsection illustrate the strong and significant influences of organizational structure on organizational flexibility. Thus the hypotheses 4a to 4d are upheld, while it must be pointed out that production flexibility should be treated separate from organizational flexibility.

6.7 ERP and Flexibility

This section aims to explore the extent to which an ERP system directly influences organizational and production flexibility, as previously suggested by Davenport (2000). It has been hypothesized, in this study, that large scale, successful ERP implementations will have a more significant impact upon flexibility than small scale, unsuccessful implementations, as shown in Figure 6.7.

Figure 6.7: ERP and Flexibility

Indeed, the correlation analysis [Refer to Table 6.17] identified significant associations between both the flexibility constructs and the ERP benefits constructs. That is the positive associations between ERP benefits and flexibility suggest that the more success that is enjoyed by an implementation of ERP, the more likely it will be that the organization will be able to deliver high levels of organizational flexibility, and better deal with production changes. As suggested by different researchers (Rashid et al. 2002; Muscatello et al. 2003), ERP is a particularly powerful form of technology that is capable of linking and integrating 'information islands' together. Therefore, the adoption of ERP helps an organization to integrate and harmonize its data and thus be more responsive and flexible (Evgeniou 2002). Moreover, MRP is one module of ERP system (Cullen et al. 2001; Mabert et al. 2003), which can potentially improve production management, and an organization’s ability to
respond flexibly to changes in demand. However, there doesn’t appear to be any significant relationship between the scale of an ERP implementation and the resultant level of flexibility. Thus, in their totality the results of this sub-section indicate that the success of an ERP project, rather than its scale, can have a significant influence on flexibility. Consequently, it can be concluded that hypothesis 5 is contingently supported.

Table 6.17: Correlation Results: ERP and Flexibility

<table>
<thead>
<tr>
<th>Hypothesis 5</th>
<th>ERP Scale</th>
<th>ERP Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coverage</td>
<td>Authorization</td>
</tr>
<tr>
<td>Organizational Flexibility</td>
<td>Correlation</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.74</td>
</tr>
<tr>
<td>Production Flexibility</td>
<td>Correlation</td>
<td>-0.16</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.09</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.8 Chapter Summary

In this chapter, correlation analysis and other statistical techniques have been employed to study the degree of association between key pairs of variables. Generally speaking, the quantitative data analyses provided interesting insights into all the original research objectives [Refer to Figure 6.8], and some statistical support for all of the hypotheses [See Table 6.18]. More specifically, it has been confirmed through this part of discussion that strategy does influence, and might even dictate, organizational structure. Moreover, it has been found that ERP adoption does influence all structural dimensions. More specifically, it was found that the adoption of ERP can help reduce organizational hierarchical levels, enlarge the span of control, decentralize its decision making and standardize organizational practices. However not all variables used to measure ERP were found to be equally influential in their impact upon the structural constructs. For example, the T tests, that compare the means of structural dimensions between ERP adopters and Non-ERP adopters, were found to have only a modest impact upon the structural dimensions, whilst the
scale of the ERP deployment had a rather more significant impact, but it was the success of the ERP deployment – as measured by the range of benefits realized – which was found to have the most significant impact.

The study also found, as hypothesized, that organizational strategy had some influence on the scale of an ERP project and the scale of an ERP has influences on the ERP benefits that were enjoyed by the adopters. Furthermore, it was found that the ERP benefits gained by the adopters were positively associated with organizational flexibility, which means that the greater the benefits, gained through an ERP deployment, the higher would be the degree of flexibility, to be enjoyed by the ERP adopters. The correlation analyses studying the influences of structural dimensions on organizational flexibility also provided statistical supports for the hypothesized relationships. These convergences indicate that a flatter organization that is highly decentralized and standardized will help it to gain more flexibility. At the same time, it was found that organizational flexibility is likely to be facilitated through effective inter-departmental integration.

In addition, when integrating all the confirmed hypotheses together, a configuration view of ‘Prospector’ strategy adopter is presented. Since the ‘Prospector’ is a strategic form that is characterised as innovative and flexible, it will demand some effort to design its structure and technology, to facilitate its pursuance of flexibility. Thus it demands a flatter, more decentralized and standardized organizational structure and this structural arrangements can be reinforced by its ERP projects.

Having explored all of the hypotheses quantitatively, it is important that complementary qualitative data analyses are conducted to help validate and interpret these statistical associations. To this end, the material presented in the following chapter seeks to provide deeper insights and richer interpretations, into the research findings, presented here.
### Table 6.18: Results of Hypothesis Tests

<table>
<thead>
<tr>
<th>Code</th>
<th>Hypotheses</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Organizations that pursue the archetypal ‘Prospector’ strategy are likely to adopt flatter organizational structures, with an extended span of control.</td>
<td>Strongly Supported</td>
</tr>
<tr>
<td>1b</td>
<td>Organizations that pursue the archetypal ‘Prospector’ strategy will typically decentralize their decision-making rights.</td>
<td>Strongly Supported</td>
</tr>
<tr>
<td>1c</td>
<td>Organizations that pursue the archetypal ‘Prospector’ strategy are more likely to introduce highly standardized working practices.</td>
<td>Strongly Supported</td>
</tr>
<tr>
<td>1d</td>
<td>Organizations that pursue the archetypal ‘Prospector’ strategy are likely to be associated with effective horizontal integration between functional departments.</td>
<td>Strongly Supported</td>
</tr>
<tr>
<td>2</td>
<td>Organizations that follow a ‘Prospector’ strategy are more likely to deploy ERP systems.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>3a</td>
<td>The deployment of ERP will be associated with a reduction of levels hierarchy, and an increase of span of control.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>3b</td>
<td>The deployment of ERP will facilitate more decentralized forms of decision-making to be adopted, within organizations.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>3c</td>
<td>The deployment of ERP will increase the degree of standardization of working practices and employee activities.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>3d</td>
<td>The deployment of ERP will increase the level of horizontal integration between departments.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>4a</td>
<td>The flatter the organizational configuration, the more flexible the organization would be.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>4b</td>
<td>The more centralized the organizational decision making, the less flexible the organization would be.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>4c</td>
<td>The more standardized the organizational structure, the more flexible the organization would be.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>4d</td>
<td>The better cross-functionally coordinated, the more flexible the organization would be.</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>5</td>
<td>The deployment of ERP will result in a more flexible organization.</td>
<td>Partly Supported</td>
</tr>
</tbody>
</table>
Chapter 6—Quantitative Data Analysis

Figure 6.8: Research Model

ERP Deployment
- Adoption
- Scale
- Success

Strategy
- R2

Structure
- Configuration
- Centralization
- Standardization
- Horizontal Integration

Flexibility
- R5

R1
R3
R4
R5
Chapter 7

Qualitative Research Findings
Chapter 7—Qualitative Research Findings

7.1 Introduction

In the last chapter, the quantitative data analyses and the results of quantitative data analyses confirmed most hypotheses of the study. This chapter aims to present the qualitative data analysis. Additionally, it will integrate the quantitative and qualitative together and presents the research findings.

Compared with quantitative data, qualitative data offers unique insight into a situation that is unavailable if only quantitative methods are used. Qualitative data provides valuable contextual information and aids the understanding of social phenomena (Bailey 1994). As mentioned before, the reason this study adopted an interview method is that this method can help gain deep understanding of the social meaning of the actions and also provide contextual data (McKee 2003) that the quantitative study alone could not provide. This is especially important for a study that is situated in a totally different culture to most other studies in the field. The qualitative data has offered insight into the ERP practices in China and the way that these are different from the western practices (Martinsons 2004; Reimers 2002). These differences also offer further understanding of how organizational structure is influenced by ERP.

Therefore, the qualitative data analysis was undertaken with three purposes. First of all, the qualitative data provided contextual detail relating to ERP in China, and so offered insight into the distinct characteristics of ERP implementation practices in China. The second aim to focus on investigating further the relationship between ERP and organizational changes, with the purpose of exploring the results from the quantitative data analysis in more detail. The third aim was to explore in particular any divergences from the hypothesis that emerged in the quantitative data.

Accordingly Section 7.2 provides a general overview of how the qualitative study was undertaken and how the qualitative data analyses were carried out. Section 7.3 describes some of the background and contextual information surrounding ERP projects in China. Next, Section 7.4 discusses the structural impact of ERP in Chinese organizations. Section 7.5 discusses the influence of ERP on the ability of organizations to respond flexibility to change. Finally, Section 7.6 offers some insights into the management practices associated with achieving ERP benefits.
Bryman (2006) suggested that in general there are five reasons for integrating the outcomes of qualitative and quantitative studies together, namely triangulation, complementarities, expansion, initiation and development. Bryman (2006) described complementarities as seeking elaboration, enhancement, illustration and clarification of the results from one method with the results from another, whilst expansion is to seek to extend the breadth and range of enquiry by using different methods for different inquiry components. As has been stated in previous section and in the methodology chapter, the qualitative study aims to supplement the quantitative data and provide extra evidence or data for studying ERP in organizations. The qualitative study is therefore used here to provide contextual information (Bryman 1988), and to explore any divergences between hypotheses and quantitative data found during the quantitative study as well as offering further validity for the research outcomes.

In order to carry out a focused and rigorous qualitative study, the process followed was that described by Kvale (1996). Generally speaking, there are seven procedures involved in the whole qualitative study process, as described by Figure 7.1 diagram (Next Page).

The planning stage of the qualitative study addresses the purpose of qualitative study (Maxwell 1996) and how the qualitative study is to be carried out. As far as the qualitative study here is concerned, the aim was to generate understanding of the ERP practices in China, provide the contextual information of the study (Dey 1993), and disclose information that might be used to understand the divergences that had emerged between the research outcomes from the quantitative data and the hypotheses. Accordingly an interview schedule was prepared and piloted before times were arranged for conducting the interviews in targeted companies.
When conducting interviews, the main issue is to choose whether to use a structured, semi-structured or unstructured format for questions (Saunders et al 2000; Gibbs 2002). Structured interviews tend to be used for explanatory purposes and unstructured interviews for more exploratory work (Saunders et al 2000, Yin 1994). The semi-structured interview can be used for both descriptive and explanatory purposes together (Saunders et al 2000) and thus this approach was selected as being more appropriate for this study. In view of this, a semi-structured interview schedule was used and designed in such a way that the interviewee could provide information that directly or indirectly links with the research aims, questions, research models and hypotheses (Saunders et al 2000). Since the study was designed to explore the relationship between the influences of ERP on organizational structure, the interview questions focused on how to specifically answer the research questions through interview questions (Creswell 1994). Also based on the research framework [See page 60] and the hypotheses of the study, interview questions were developed that explored the research questions in more
Chapter 7—Qualitative Research Findings

detail (Saunders et al 2000). For example, the research model focuses on the relationship between ERP and organizational structure. Thus, questions relating to the impact of an ERP project on the different aspects of structural change were developed.

When designing qualitative data collection it is important to ensure the data collected is aligned with the purposes of the qualitative study. For example, several studies (He 2002; Martinsons 2004; Reimers 2002) of ERP in China have argued that there are distinctive differences between China and the West. Thus in order to generate more understanding of general ERP practices in China, some questions were designed to explore the main reasons for ERP adoption in China and how companies had implemented the project [Refer to Appendix III (English Version) and Appendix IV (Chinese Version)]. For example one question exploring the motives of ERP adoption used was:

What were your main motivations / the key drivers for your organization to adopt ERP? [See Appendix III p239]

After the design of the questions list, the pilot tests were conducted in order to gather information with regards to how well the interview schedule had been designed. Due to problems finding interviewees (Saunders et al 2000), four interviews were conducted as a pilot study, all of which were undertaken with contacts who worked near the living place of the interviewer, but who were not necessarily from manufacturing companies. These interviews were all conducted with the senior officials or director responsible for IS, who it was assumed would be more knowledgeable about ERP when answering the questions (Saunders et al 2000). Meanwhile the interviews conducted in this period also benefited the study by providing feedback and thus aiding in an improved interview schedule for the main qualitative data collection [Refer to Appendix III and IV]. For example, during the pilot test, it was found that the interviews took much longer than anticipated so the questions needed to be much more focused. Also in order to accurately and quickly communicate the questions, a prepared script for the interviewee helped to improve the flow of the interviews. Finally, it was found while some interviewees may not spend too much time answering questions, others would be glad to talk more than the time prearranged, so the interviewer needed to be prepared to ask the questions in a more flexible manner rather than asking them sequentially. By so doing, the interview was usually more focused whilst allowing time able to explore
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interesting points.

After collecting the pilot data, the data was carefully transcribed, and this raised two issues, namely transcribing from oral format to written format (Weitzman and Miles 1995; Saunders et al. 2000) and translation from Chinese to English (Peng and Luo 2000; Schlevogt 2001). First of all, in order to focus on the emerging issues, an audio tape recorder was used for recording the interview (Saunders et al 2000). Thereafter the audio information was transcribed into word format documents. Secondly, in order to ensure the accuracy of the translation, back translation (Sin et al. 2003) was employed to translate the transcribed Chinese word document into English documents in order to assure the validity of the translation in the cross cultural setting (Luo and Peng 1999; Brislin 1970).

After the initial review of pilot interviews, it was found that the questions focused too much on background information and asked some questions that might be inappropriate or unnecessary. For example, the original questions sought find the interviewee's opinion on the relationship of strategy, structure and ERP. The question is too ambiguous and was deleted before the main interview stage (Moser and Kalton 1971). Finally the original questions list failed to ask some important questions which although were not the focus of the study, were regarded as being useful in that these questions might disclose important information for understanding the targeted companies (Moser and Kalton 1971). In view of this, the interview schedule was redesigned [Refer to Appendix V and VI].

Thereafter, in the main interviewing stage, the interviews were conducted after all the questionnaires were distributed out to the targeted companies. In view of the difficulties in gaining access to potential companies (Saunders et al 2000), the interviews were conducted intensively during this period, and the companies were mainly located in North China except three foreign owned companies who were situated in Shanghai. In all, twenty six interviews were conducted with twenty eight senior officers from twenty companies [Refer to Table 7.1].

The interviewees selected for the main interviews were again all senior officials from the targeted companies. One person was an ERP consultant who worked for ERP vendor (Oracle), chosen to provide some background into ERP practices in China from a different perspective (Emari et al 2006). Some interviews were conducted with two senior officials simultaneously, due to the interviewees requesting this...
Chapter 7—Qualitative Research Findings

arrangement. All the interviews depended on the extent to which the targeted company was prepared to provide time and resources for interviews (Saunders et al 2000). All the interviews were transcribed using the same approach used in the pilot study.

Table 7.1: Company Code

<table>
<thead>
<tr>
<th>Company</th>
<th>Company Ownership</th>
<th>Interviewee Position</th>
<th>Interview Location</th>
<th>Interview Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>State Owned Enterprise</td>
<td>Vice President</td>
<td>Beijing</td>
<td>2006 September</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>State Owned Enterprise</td>
<td>Marketing Director</td>
<td>Beijing</td>
<td>2005 July</td>
</tr>
<tr>
<td>C3</td>
<td>Private Venture</td>
<td>Chairman</td>
<td>Beijing</td>
<td>2006 July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>State Owned Enterprise</td>
<td>Technical Manager</td>
<td>Jinan</td>
<td>2006 June</td>
</tr>
<tr>
<td>C5</td>
<td>State Owned Enterprise</td>
<td>IT Manager</td>
<td>Binzhou</td>
<td>2006 April</td>
</tr>
<tr>
<td>C6</td>
<td>Private Venture</td>
<td>HR Director</td>
<td>Zhengzhou</td>
<td>2006 May</td>
</tr>
<tr>
<td>C7</td>
<td>Private Venture</td>
<td>Financing Director</td>
<td>Beijing</td>
<td>2005 August</td>
</tr>
<tr>
<td>C8</td>
<td>State Owned Enterprise</td>
<td>IT Manager</td>
<td>Beijing</td>
<td>2005 July</td>
</tr>
<tr>
<td>C9</td>
<td>State Owned Enterprise</td>
<td>IT Manager</td>
<td>DongYing</td>
<td>2005 April</td>
</tr>
<tr>
<td>C10</td>
<td>State Owned Enterprise</td>
<td>IT Director</td>
<td>BinZhou</td>
<td>2006 September</td>
</tr>
<tr>
<td>C11</td>
<td>State Owned Enterprise</td>
<td>Vice Director</td>
<td>Donying</td>
<td>2005 June</td>
</tr>
<tr>
<td>C12</td>
<td>Foreign Owned Enterprise</td>
<td>Director of Purchasing</td>
<td>Shanghai</td>
<td>2006 July</td>
</tr>
<tr>
<td>C13</td>
<td>State Owned Enterprise</td>
<td>Finance Director</td>
<td>Dongying</td>
<td>2005 April</td>
</tr>
<tr>
<td>C14</td>
<td>State Owned Enterprise</td>
<td>IT Manager</td>
<td>Donge</td>
<td>2006 August</td>
</tr>
<tr>
<td>C15</td>
<td>Foreign Owned Enterprise</td>
<td>Purchasing Manager</td>
<td>Shanghai</td>
<td>2006 July</td>
</tr>
<tr>
<td>C16</td>
<td>Private Venture</td>
<td>Executive Assistant</td>
<td>Beijing</td>
<td>2006 May</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT Manager</td>
<td></td>
<td>2006 April</td>
</tr>
<tr>
<td>C17</td>
<td>Foreign Owned Enterprise</td>
<td>IT Manager</td>
<td>Hangzhou</td>
<td>2006 July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing Manager</td>
<td></td>
<td>2006 July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ERP Consultant</td>
<td></td>
<td>2006 July</td>
</tr>
<tr>
<td>C18</td>
<td>Private Venture</td>
<td>IT Manager</td>
<td>Weifang</td>
<td>2006 August</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Manager</td>
<td></td>
<td>2006 August</td>
</tr>
<tr>
<td>C19</td>
<td>Private Venture</td>
<td>HR Manager</td>
<td>Beijing</td>
<td>2006 July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT Manager</td>
<td></td>
<td>2006 October</td>
</tr>
<tr>
<td>C20</td>
<td>Private Venture</td>
<td>Financing Manager</td>
<td>Beijing</td>
<td>2006 July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vice Director</td>
<td></td>
<td>2006 July</td>
</tr>
</tbody>
</table>
Chapter 7—Qualitative Research Findings

Yin (2003) suggests that when research makes use of existing theory to formulate research questions or objectives, this approach should also be used for the data analysis. In order to make the interview data more manageable and to aid analysis, the data collected from the interviews was summarised and categorized into themes that were relevant to the research aims (Seidel and Kelle 1995). This 'reduced' data was input into an Excel summary matrix (refer to Appendix XI). This categorisation of the data provided a summary which made it easier to find the appropriate cases and to understand any convergence and divergences between the interview data and the outcomes of the quantitative data (Dey 1993). For example, in order to understand the structural changes due to the ERP project made in a particular company, the interview data was first grouped by the structural elements such as configuration, centralization standardization and the interdepartmental relationships.

More importantly, the summarized data provided an easy means for identifying any common trends and patterns (Saunders et al 2000). For example, in gaining an understanding of the changes to organizational standardization in Case I (Refer to Appendix XI), a summary of the response from the interviewee was input into the relevant cell in the Excel spreadsheet. The reason for the change in this company could then be referred to quickly without going through the whole transcript. In this way, the Excel spreadsheet provides a condensed matrix for gaining an overall understanding of the main themes of the qualitative research and also the appropriate transcript can be identified and referred to for clarification if required.

After the data analyses described above was completed, the results of the analyses were written up. In general, the qualitative study yielded findings under four main themes. First, it offered background and contextual information surrounding ERP projects in China. Second, the data yields insight into the impact of ERP implementation on organizational structure. Third, the data offered some interesting outcomes concerning the relationship between ERP and organizational flexibility. Finally, the data offered some insights into the management practices associated with achieving ERP benefits. Not all the outcomes of the qualitative study align exactly with the outcomes of the quantitative study and often the reasons for the apparent contradiction can be found in the cultural differences between China and the west when implementing ERP systems. First then, it is important to discuss the context and background to ERP implementation in China.
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7.3 Contextual Issues

The adoption of ERP will inevitably demand some organizational changes during the ERP implementation stage (Markus et al. 2000b; Scott and Vessey 2000; Hall 2002). It has also been reported that ERP adoption in China, though sharing some common characteristics with Western counterparts, has distinct features due to its cultural differences (Zhang et al 2005; Xue et al 2005) and financial difficulties (He 2004). So the qualitative study was aimed at exploring the background to ERP implementation practices in China.

7.3.1 Reason for ERP adoption

In this study, following the lines of argument of Miles and Snow (1987) it was argued that the organizational strategy will influence ERP adoption. Markus and Tanis (1999) also had suggested that in the west, the motives for ERP adoption divided broadly into two categories, namely technical motives and business motives, hence it was reasonable to assume that companies adopting a prospector strategy would be more likely to implement ERP for strategic reasons and this was expressed in hypothesis 2 in the research model [See page 60]. However, the quantitative data analysis only provided partial support for this hypothesis. What was found to be significant was the relationship between organizational strategy and ERP benefits. This would suggest that the decision to adopt ERP and the scale of the ERP system is not necessarily related to a strategic plan and so not as important in achieving benefits as has been assumed in other studies [See Martinsons 2004]. What becomes apparent through the outcomes of the interviews in this research is that in China, external pressure to adopt ERP is also an important factor.

Table 7.2 overleaf summarizes the reasons that interviewees gave for the choice to adopt ERP and these are quite varied, but many involve some sort of external pressure. For example, some interviewees suggest that they adopted ERP because it was necessary to meet the expectations of both the government and also external investors. For example the interviewee from C13 suggested:

"...the decision was taken by our supervisory government ministry. [...] before our company was listed on the stock exchange we promised our external investors that we would do this. We want to deliver a clear message to our external investor that we will standardize our company and offer them more transparent information. [...]"
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However we also had our own internal reasons to install the system [...] internally, we needed more transparent information and the capability to collect timely and accurate information regarding our own operations.”

Table 7.2: Summary of Reasons to Adopt ERP

<table>
<thead>
<tr>
<th>Company</th>
<th>Ownership</th>
<th>Reasons of Adopting ERP</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Stated controlled share company⁵</td>
<td>Set up a mature IS for managing logistics, business processes and money flow</td>
</tr>
<tr>
<td>C2</td>
<td>PV</td>
<td>To cope with rapid expansion and to control organization</td>
</tr>
<tr>
<td>C3</td>
<td>PV</td>
<td>To cope with expansion and to build a common IS platform</td>
</tr>
<tr>
<td>C4</td>
<td>SOE</td>
<td>Headquarters made the decision to implement ERP.</td>
</tr>
<tr>
<td>C5</td>
<td>SOE</td>
<td>A management fashion</td>
</tr>
<tr>
<td>C6</td>
<td>PV</td>
<td>Key customer required them to do so.</td>
</tr>
<tr>
<td>C7</td>
<td>FOE</td>
<td>To provide timely information for operation</td>
</tr>
<tr>
<td>C8</td>
<td>SOE</td>
<td>Headquarters took the decision to implement ERP.</td>
</tr>
<tr>
<td>C9</td>
<td>State controlled share company</td>
<td>To better cope with the management problems and bad logistics management</td>
</tr>
<tr>
<td>C10</td>
<td>State controlled share company</td>
<td>We needed to replace legacy IS to support our operations</td>
</tr>
<tr>
<td>C11</td>
<td>SOE</td>
<td>Headquarters took the decision to implement ERP prior to listing the company on the stock exchange.</td>
</tr>
<tr>
<td>C12</td>
<td>FOE</td>
<td>Corporation policy demanding worldwide subsidiaries to adopt ERP system</td>
</tr>
<tr>
<td>C13</td>
<td>SOE</td>
<td>Corporation policy demanding worldwide subsidiaries to adopt ERP system</td>
</tr>
<tr>
<td>C14</td>
<td>PV</td>
<td>To better align their off-site sales department with the other parts of the company</td>
</tr>
<tr>
<td>C15</td>
<td>FOE</td>
<td>Emphasis on efficiency and connection of material flows</td>
</tr>
<tr>
<td>C16</td>
<td>PV</td>
<td>To cope with organizational expansion and to better manage their logistics and material flow.</td>
</tr>
<tr>
<td>C17</td>
<td>FOE</td>
<td>Corporation policy for worldwide subsidiaries to adopt ERP system</td>
</tr>
<tr>
<td>C18</td>
<td>PV</td>
<td>To improve their management capabilities and to gain more efficiency</td>
</tr>
<tr>
<td>C19</td>
<td>PV</td>
<td>“Going public”, to improve their management capabilities and to cope with expansion</td>
</tr>
<tr>
<td>C20</td>
<td>PV</td>
<td>To strengthen their data and financial management</td>
</tr>
</tbody>
</table>

⁵ The Company under this kind of ownership is listed in stock market but State is their biggest shareholder.
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It is important to note that the interviewees regarded a head office direction to adopt ERP as being a reason that was external to their concerns. This meant that a majority of interviewees perceived the decision to adopt ERP was taken for reasons that were external to their particular company and so not related to their strategy for their company. This perception that the decision to adopt ERP was external to the company might account for the lack of association between the organizational strategy and ERP found in the quantitative data analysis.

Some of the interviewees showed a very clear understanding of the competitive nature of their industry and had tried to gain some competitive advantages from the ERP adoption. The market leader, C19, showed a strong desire to build further success through the ERP system:

"... The General Manager wanted to improve our management. And he needs us to be the leader in every perspective, our management, our market share and our information system".

Chinese companies adopt ERP for different reasons. For those who adopt ERP only because they were directed to do so, ERP adoption seems to lack a strategic impetus and so these companies have not reaped as many of the benefits from ERP implementation as others. This is discussed further in Section 7.6.

7.3.2 Implementation Issues

From the interview data there do seem to be some differences between western and Chinese practices as regards the commitment given to the project by the top management (Chen 2001; Xue et al 2005). Such support has been widely argued to be an important factor in deciding whether the ERP implementation would be successful or not (Markus and Tanis 1999; Chen 2001; Al-Mashari et al. 2002; Kumar et al. 2002; Robey et al. 2002; Muscatello et al. 2003; Sarker and Lee 2003; Umble et al. 2003; Voordijk et al. 2003; Law et al. 2007). Most failure cases seem to result from insufficient commitment from top management (Xue et al 2005). C17 is typical. In this case, the initial ERP adoption was not successful due to lack the support from senior management, but after this group of managers benefited from the information provided by the ERP system, they began to place more importance on this software and during the second stage of development/optimization the senior management got involved in the ERP project to ensure that benefits were
"The top management did not care too much about the ERP when it was initially installed. But it is different now, senior managers are getting more and more involved in the ERP project and placing more attention on this project. After a period time, we found that the ERP is a really useful management tool. Its function could not be substituted by other systems at all."

There are other issues too. The interviewee from C10 reported that staff had strongly resisted the implementation of ERP; the project leader [the interviewee] had resorted to sacking the wife of one vice president in order to get the project up and running. He was able to take this action as he was strongly backed by their general manager, and eventually the project had been a success.

So it seems from the interview data that top management is as important to the success of ERP projects in China as in the west.

In other projects staff were made redundant and in some cases the company had to recruit new graduates who had the skills to cope with the new technology in order to make the project work (Ragowsky and Somers 2002), see for example C5 where the interviewee said:

“Yes staff numbers were reduced. In cost control management, we used to need 7-8 staff, now one person is enough.”

The importance of training, motivation and a planned transition to the new system is highlighted by the interviewee from C19, which corresponds to the research findings from Xue et al (2005). Here the staff complained that their workload had doubled because they needed to cope with two systems, the old working practices and the new processes designed for the ERP system, both these systems were operating simultaneously and little training had been provided. Unsurprisingly many staff resisted this situation. Without good quality training, it takes longer for users to learn to cope with the new practices required.

7.3.3 Cultural Differences between China and the West

The Chinese market for ERP software is more diverse than that in the west (Xue et
al 2005; Wang et al 2004). Well known ERP vendors such as Oracle, SAP and Peoplesoft do have a large market share (Rashid et al. 2002), but there are also lots of local Chinese ERP vendors that sell their own products (Hanseth et al 2001; He 2004). This then leads to a question what kind of vendor, foreign or local, was chosen by companies when selecting ERP. In this study it seemed that the ERP vendor was chosen for two reasons. Firstly the cost associated with ERP implementation and training was considered; secondly, companies want to apply ERP to tackle management issues such as the integration with headquarters so experience in this area was looked for in the vendors (Poston et al. 2000). Other criteria for choosing ERP vendor included whether the company believed that the foreign practices embedded in the software would be compliant with their own practices (Zhang et al 2005; Wang et al 2004). For example, when asked about how the ERP package had been selected, the director of C5 commented that:

"...Our IS department prepared a report that said foreign ERP software is designed in a foreign country according to their own practices. It was considered too risky to choose a foreign vendor and their fees are too high to be affordable. Although some foreign owned companies in China have used western ERP very well, most nationally owned companies have failed to use this type of ERP successfully. In view of this, we invited several domestic vendors to attend a tendering process."

The director of C3 also pointed out that the charges made by foreign ERP vendors were too high and that:

"...we needed a platform to accommodate our style of working. So we would have had to make lots of modifications to the standard software. [...] In view of this, we found a small local company, best satisfied our requirements."

One of the interviewees was an ERP consultant [See C17]. He suggested that in contrast to the west, very few Chinese ERP vendor consultants will suggest changes such as staff reduction, or changes to organizational structure as these topics are too sensitive and related to organizational politics. These issues are left to the discretion of the business. The impact of the ERP system on organizational culture would seem to depend very much on the vision of the internal staff, in particular the strategic vision of the leadership team for an ERP project in China seems to be just as crucial, perhaps even more so, as in the west.
Furthermore, the interview data suggested that there are different levels of understanding of what ERP systems can offer across different businesses in China. ERP is more than a traditional IS system (Hedman and Borell 2002). The adoption of ERP demands a strategic understanding of its implications on organizational management (Hedman and Borell 2002). For example, several interviewees from Chinese state owned companies acknowledged that the adoption of ERP had been regarded as an effort to ‘informationalize’ the company. In stark contrast, an interviewee from a foreign owned company [Case12] clearly pointed out that their ERP project has been directed to support their strategy. These different levels of the understanding of potential benefits of ERP might partly explain some of the results from the quantitative study. (In Chapter 6, the results of the questionnaire suggested that the mere adoption of ERP system does not automatically give rise to a clear impact on the organizational structure, p146).

To conclude, in this subsection the background context with regards to the ERP practices in China has been presented and the special features associated with ERP adoption in China have been identified. The main differences between Chinese ERP practices with western counterparts, seems to be that decisions are taken to implement ERP software modules, particularly the financial modules, in order to facilitate a company being floated on the stock exchange – or ‘going public’. This could account for the weak correlation between organizational strategy and ERP described in Chapter 6 (See page 135). In the next section, the structural impact of ERP implementation on the companies will be explored through the qualitative data and links with the quantitative data are identified.

7.4 The Impact of ERP on Organizational Structure

In this study, it has been hypothesized that ERP implementation can impact upon the organizational structure and this has been explored through the impact of ERP on four different aspects of structure namely, configuration, centralization, standardization and horizontal integration. The findings of the qualitative study offered some interesting divergences from the outcomes of the quantitative study and these are discussed below.

7.4.1 Influences of ERP on Configuration

In this study, it was hypothesized that ERP has the power to flatten organizational
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structure (Avgerou 2000) and help managers increase their span of control through more efficient and effective information provision and better communication (Mabert et al. 2003). The quantitative data provided empirical support with regards to the hypotheses, but the interview data did not fully support this outcome; indeed most interviewees suggested that ERP did not change the configuration of their organization and that the ERP system had not and would not change the span of control. Only three respondents acknowledged any changes to the configuration of their organizational structure reporting that the improved efficiency and management of information had helped them to reduce the number of staff and consequently the middle levels of management [See Table 7.3].
Chapter 7—Qualitative Research Findings

Table 7.3: Summary of Interview Data on Configuration Construct

<table>
<thead>
<tr>
<th>Company</th>
<th>Changes of Configuration</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>No change</td>
<td>Interviewee argued that ERP can't ultimately improve managers' capability</td>
</tr>
<tr>
<td>C2</td>
<td>No change</td>
<td>Production is the department with most of staffs and ERP can't significantly help to manage those staff.</td>
</tr>
<tr>
<td>C3</td>
<td>No change</td>
<td>Clearly told vendor that they won't do change to the configuration</td>
</tr>
<tr>
<td>C4</td>
<td>No change</td>
<td>ERP can do little change to the SOEs and some restructuring efforts before ERP adoption</td>
</tr>
<tr>
<td>C5</td>
<td>No change</td>
<td>Some flattening and downsizing effort before ERP adoption</td>
</tr>
<tr>
<td>C6</td>
<td>No change</td>
<td>Not necessary to change configuration on the reason of ERP adoption</td>
</tr>
<tr>
<td>C7</td>
<td>No change</td>
<td>Interviewee argued that ERP has nothing to do with organizational structure</td>
</tr>
<tr>
<td>C8</td>
<td>Yes</td>
<td>The efficiency provided by ERP help to reduce the number of staff and thus helps to reduce the number of hierarchical levels.</td>
</tr>
<tr>
<td>C9</td>
<td>Yes</td>
<td>Changes due to the efficiency provided by ERP, which help to eliminate some middle level managers</td>
</tr>
<tr>
<td>C10</td>
<td>Yes</td>
<td>Changes due to improved management information and consequently it is not necessary to have more management layers.</td>
</tr>
<tr>
<td>C11</td>
<td>No change</td>
<td>There are some restructuring efforts before ERP adoption</td>
</tr>
<tr>
<td>C12</td>
<td>No change</td>
<td>BPR before ERP adoption</td>
</tr>
<tr>
<td>C13</td>
<td>No change</td>
<td>There are some restructuring efforts before ERP adoption</td>
</tr>
<tr>
<td>C14</td>
<td>No change</td>
<td>They have tried to flatten organizational structure before.</td>
</tr>
<tr>
<td>C15</td>
<td>No change</td>
<td>Interviewee argued that ERP has limited influences on configuration</td>
</tr>
<tr>
<td>C16</td>
<td>No change</td>
<td>Restructuring efforts undertaken before the ERP adoption</td>
</tr>
<tr>
<td>C17</td>
<td>No change</td>
<td>Companies don't want to change general configuration and it was suggested that ERP adopters would be able change their structure only after they fully realize the benefits of ERP adoption, after a period time of using ERP.</td>
</tr>
<tr>
<td>C18</td>
<td>No change</td>
<td>Too much politics within the company</td>
</tr>
<tr>
<td>C19</td>
<td>No change</td>
<td>Interviewee suggested ERP is used to fit their structure, rather than vice versa</td>
</tr>
<tr>
<td>C20</td>
<td>No change</td>
<td>Interviewee suggested it is not necessary for them to change configuration due to their small size.</td>
</tr>
</tbody>
</table>

Most managers described ERP as a process oriented software but stated that they did not believe ERP influenced the configuration of the company. For example, the interviewee from C5 suggested that although some changes had occurred, it wasn't possible to identify the total effect of changes because some departments had
Chapter 7—Qualitative Research Findings

reduced the number of hierarchy levels and other departments and increased theirs. Interviewee 1 from C1 suggested that the hierarchical levels in Chinese organizations have a particular meaning in that they referred to a person’s rank and level of seniority in the company; similar to ranks in an army, the ranks offered status and were not changed. This interviewee was also adamant that managerial levels could not simply be removed and commented that a manager was not capable of supervising 100 people as it was not possible to watch all of these people at the same time [See Appendix X].

The result here is surprising, because both the quantitative data and the literature (Hall 2002) suggested that the adoption of ERP can change organization configurations. In view of this, further questions were asked to explore the possible reasons that might account for the organizational configuration remaining unchanged [Refer to Table 7.2].

When asked why the configuration of the company had remained unchanged, some interviewees commented that their company had already restructured before the adoption of ERP. For example, the director of C12 suggested that the company had reduced staffing levels in the 1990s and that this change had been strategy led, with the ERP system offering further support in order to fully implement the strategy [See Appendix IX].

The divergence between the outcomes from the interview data and the quantitative data might be attributable to restructuring efforts made by companies before the adoption of ERP, [See also Martinsons 2004]. A further reason might be the fact that many of the privately owned companies adopted ERP due a phase of quick expansion, this meant that the company was growing and any increased efficiency offered through ERP was hidden in the increase of organizational size due to economic success. Consequently, while ERP might have provided the adopters information and operational benefits which enabled them to flatten their organization, they have had to also cope with the increase of organization size. But another reason for the lack of change to the organizational configuration, was suggested by the ERP consultant [C17]; he explained that often changes in structure were not made compulsory when the ERP system was implemented, allowing companies to keep their traditional hierarchical system. For SOEs in particular, headcount reduction is a sensitive topic that neither the top managers nor the ERP consultant would like to address.
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The outcomes from the quantitative study had suggested a further process may be in operation. In Section 6.5, the correlation and T test together suggested that ERP benefits were the best measure of ERP success, and are the most effective predictor of changes to the organizational configuration. Consequently, it is reasonable to argue that those companies who have not yet changed their organizational configuration may do so in time as they begin to realize the benefits of ERP implementation.

7.4.2 Influences of ERP on Standardization

In this study, it was hypothesized that the adoption of ERP will result in a more standardized organizational structure, which was supported by the quantitative data and the qualitative data also provided strong and uniform support for this hypothesis.

Perhaps unsurprisingly, the relationship between ERP and standardization is endorsed by all interviewees. For example, one respondent from C15 suggested that ERP supported a “high degree of standardization [...] ERP specifies the procedures you need go through and the ways and procedures you need to do. [...] ERP itself is like a written manual and it limits you effectively”.

Thus, ERP adoption leads to an almost compulsory standardization effort (Hanseth et al. 2001; Hall 2002) and to developing working practices according to pre-set procedures and working practices (Hanseth et al. 2001). The outcomes of this research establish that whilst ERP, as expected, forces standardization, other expected characteristics of ERP implementation in the west such as organizational reconfiguration and centralization can be avoided in Chinese contexts if the management chooses. This is discussed below.

7.4.3 Influences of ERP on Centralization

It was hypothesized in this study that the adoption of ERP enables a decentralized structure due to the improved efficiency and effectiveness of information provision and also due to better communication capabilities (Walsham 1993). The quantitative data had provided strong support for this hypothesis and several respondents from the qualitative interviews also suggested that decentralization is largely accounted for by the increased degree of standardization, but many other interviewees suggested that ERP did not change organizational centralization.
Those who suggested that the adoption of ERP had resulted in changes to the degree of organizational centralization commented that the main reason for the change was due to working practices becoming more standardized as a direct result of ERP adoption, this standardization had also led to the clarification of organizational responsibilities. As discussed above, all of the interviewees had reported that the adoption of ERP had resulted in a uniformly more standardized organizational structure. Some interviewees suggested that compared with foreign companies, Chinese companies often lacked the necessary rules and regulations to standardize staff working practices [Refer to Table 7.3]. For example, the respondent from C4 suggested that they lacked the “means to properly control staff. [...] We control financial rights but we can’t control other aspects of people’s work. [...] ERP helps to reduce the level of human discretion”. The control of individuals was left to the discretion of the supervisors and managers in that department. However, the introduction of ERP enabled new management practices to be introduced. For example, the respondent from C10 suggested:

“Our original idea in adopting this ERP system was to eliminate the influence of traditional Chinese management practices. Through ERP we have been able to reduce the staff to a minimum so we can focus on the business”.

ERP also encourages the integration of different departments, which will require the staff to work together according to the procedures, so one purpose of the ERP system is to make clear who has what responsibilities at every stage of a process. In turn this approach helps the management to easily identify who or for what reason a job did not get completed and this aspect of the system is especially useful to push staff to work according to rules and regulations. Once personnel were working according to set rules, regulations and procedures some interviewees reported further change became apparent, in that it became unnecessary for the staff to get approval from their supervisors any more. For example, the interviewee from C5 suggested that middle managers had become empowered to make their own decisions and did not have to ask senior staff for their advice or permission any more and that this change was directly related to the ERP system: “middle line managers are getting more confident as they now have the evidence to support their decision making”. Similarly, the interviewees from C6 and C14 suggested that ERP itself prescribed or ‘absorbed’ some decision rights and thus, it was not necessary for supervisors to make all the decisions.
Chapter 7—Qualitative Research Findings

The increased organizational standardization seems then to enable some Chinese organizations to more effectively control their staff and thus allow top management to decentralize some decision rights—if they wished to do so.

Table 7.4: Summary of Interview Data on Centralization

<table>
<thead>
<tr>
<th>Company</th>
<th>Changes of Centralization</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Some changes</td>
<td>Some decision rights transferred to ERP</td>
</tr>
<tr>
<td>C2</td>
<td>No change</td>
<td>Interviewee suggested that ERP has little influence on decision making</td>
</tr>
<tr>
<td>C3</td>
<td>No change</td>
<td>Interviewee suggested that ERP has little influence on decision making</td>
</tr>
<tr>
<td>C4</td>
<td>No change</td>
<td>Interviewee suggested that, without external pressure and incoming benefits, top manager would not change those issues.</td>
</tr>
<tr>
<td>C5</td>
<td>Decentralized</td>
<td>The timely and improved information and the clarified responsibilities enable middle line manager to make decision with confidence.</td>
</tr>
<tr>
<td>C6</td>
<td>No Change</td>
<td>Interviewee suggested centralization is greatly influenced by leadership and ERP has nothing to do with degree of centralization</td>
</tr>
<tr>
<td>C7</td>
<td>No change</td>
<td>Interviewee argued that ERP has nothing to do with centralization</td>
</tr>
<tr>
<td>C8</td>
<td>Decentralized</td>
<td>The clarified responsibility helps to delegate decision making.</td>
</tr>
<tr>
<td>C9</td>
<td>Decentralized</td>
<td>The clarified responsibility, processes, and the improved standardization help to decentralize decision makings</td>
</tr>
<tr>
<td>C10</td>
<td>Decentralized</td>
<td>ERP enables a decentralized structure.</td>
</tr>
<tr>
<td>C11</td>
<td>No Change</td>
<td>Interviewee suggested that the company is an SOE and has no motivation to change organizational structure</td>
</tr>
<tr>
<td>C12</td>
<td>Changed</td>
<td>The issues relating to purchasing and accounting were centralized but the other normal operations were decentralized.</td>
</tr>
<tr>
<td>C13</td>
<td>Changed</td>
<td>The issues relating to purchasing and accounting were centralized because headquarters for a long time wanted to centralize those decisions. ERP adoption enabled this centralization.</td>
</tr>
<tr>
<td>C14</td>
<td>Decentralized</td>
<td>Clarified decision rights, due to the installation of ERP, help middle line managers to make decision by their own.</td>
</tr>
<tr>
<td>C15</td>
<td>No Change</td>
<td>Interviewee suggested that centralization is a matter of leadership.</td>
</tr>
<tr>
<td>C16</td>
<td>No Change</td>
<td>Interviewee suggested that strategy rather than ERP has more influence on the issues of degree of centralization</td>
</tr>
<tr>
<td>C17</td>
<td>Centralized</td>
<td>Top managers want to get more control on decision makings</td>
</tr>
<tr>
<td>C18</td>
<td>No change</td>
<td>Due to top manager’s willingness to make decision by themselves.</td>
</tr>
<tr>
<td>C19</td>
<td>No change</td>
<td>They only want to change their information management rather than the decision making rights.</td>
</tr>
<tr>
<td>C20</td>
<td>No Change</td>
<td>Interviewee suggested that ERP adoption has nothing to do with centralization.</td>
</tr>
</tbody>
</table>

It was also found, as seen in Table 7.4, that not all companies have changed the
decision making rights in their particular organization. In these companies it would seem that the leadership style of the senior management has prevented the decentralization of decision making. Some interviewees went as far as to suggest that ERP has nothing to do with decision making rights, suggesting that a traditional organizational decision making structure was more effective for Chinese companies [See Company 6]. Such managers it would seem are more comfortable with traditional Chinese practices and prefer a model of centralized managerial control. The ERP consultant from C17 suggested that many ERP adopters will only change their structure after they recognize the potential benefits to be gained from ERP.

The qualitative data then suggests that whilst ERP can support the clarification of responsibilities and help to standardize working practices, it is the leadership within an organization that controls the delegation of decision making rights. The mere adoption of ERP will not make significant changes to organizational centralization. This further implies that in order to realize the benefits of ERP implementation, it is important that the senior management take a strategic view of their business and understand how decentralization of decision making facilitates organizational flexibility and improved responsiveness in dynamic environments.

7.4.4 Influences of ERP on Horizontal Integration

In this study, horizontal integration was hypothesized to be influenced by ERP adoption, because ERP software has an embedded process oriented design (Booth et al. 2000; Davenport 2000b), that would inevitably demand the change of the organization in order to make the software viable. The embedded process oriented design can also influence the horizontal relationships within an organization. The questionnaire had explored the potential association between interdepartmental relationships with the ERP adoption, but, as discussed in Chapter 6, the quantitative data analysis failed to provide full support for this hypothesis. Thus this section aims to explore the lack of support for Hypothesis 3d: the adoption of ERP will increase the level of horizontal integration between departments.

During the quantitative analysis the variables used to test the interdepartmental relationship included the sharing of co-objectives, the interdepartmental boundary, the atmosphere among interdepartmental staff, how easy it is to communicate interdepartmentally and the building and maintenance of informal interdepartmental communication channels. It was expected that ERP implementation would demand
team work across organizational departments (Koch and Buhl 2001) and would consequently result in better horizontal relationships. The qualitative study explored horizontal integration in several ways. First of all, the interviewees were asked whether their organizations had been changed to become more process oriented (Davenport 2000b) after the adoption of the ERP. Secondly, questions relating to interdepartmental communications were asked. And thirdly, the qualitative data also explored changes in interdepartmental politics. See Table 7.5.

Table 7.5: Summary of Interview Data on Horizontal Integration

<table>
<thead>
<tr>
<th>Company</th>
<th>More Process Orientation</th>
<th>Better Interdepartmental communication</th>
<th>Less Interdepartmental politics</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, Easily identified Problems and easily to get agreement</td>
</tr>
<tr>
<td>C2</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
</tr>
<tr>
<td>C3</td>
<td>Yes</td>
<td>Improved communication and reduced oral communications</td>
<td>No change, interdepartmental relationship is good all along</td>
</tr>
<tr>
<td>C4</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No changes due to the nature of the company-SOE</td>
</tr>
<tr>
<td>C5</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, due to the clarification of responsibilities</td>
</tr>
<tr>
<td>C6</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, but there are some human discretion</td>
</tr>
<tr>
<td>C7</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
</tr>
<tr>
<td>C8</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, Clarified responsibilities</td>
</tr>
<tr>
<td>C9</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, specific and clear responsibilities of each staff</td>
</tr>
<tr>
<td>C10</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>Yes, due to clarified responsibilities.</td>
</tr>
<tr>
<td>C11</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
</tr>
<tr>
<td>C12</td>
<td>No big change, did BPR before</td>
<td>Communication is good all along</td>
<td>Emphasized teamwork with and without ERP, No big changes</td>
</tr>
<tr>
<td>C13</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
</tr>
<tr>
<td>C14</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, they can trace problems easily and argue with evidence</td>
</tr>
<tr>
<td>C15</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, but there are still some conflicts</td>
</tr>
<tr>
<td>C16</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, by dint of clarified responsibilities, but not significant.</td>
</tr>
<tr>
<td>C17</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, reduction of problems resulting from unclear responsibilities</td>
</tr>
<tr>
<td>C18</td>
<td>No change</td>
<td>No changes</td>
<td>No changes, interdepartmental relationship is good all along</td>
</tr>
<tr>
<td>C19</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>Yes.</td>
</tr>
<tr>
<td>C20</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
</tr>
</tbody>
</table>
Most of the interviewees reported that the adoption of ERP made it necessary for different departments to coordinate their tasks in order to complete work. For example, the interviewee from C11 suggested:

"Because every link in the process needs to coordinate with each other, every time you complete one task, you need to call the next immediate person in the process so that he knows he can start his job now."

Similarly, the interviewee from C15 suggested:

'ERP makes clear the entire department's responsibility and all departments have quite clear procedures to do the job. ERP formalizes those responsibilities and procedures so that all staff do their job and duties according to the ERP system in order to guarantee normal running. If not, the management can easily locate the problematic link."

In addition to the improved process connections among departments, it was also found that due to the shared database, organizational communication can be significantly improved. For example, the interviewee from C7 suggested that:

"We can use the accounting and purchase as example. For PR (Purchasing requisition) and PO (Purchasing Order) which demand relevant checking procedures, ERP plays a great role in linking different procedures."

In contrast to the results from the consensus in the interview data on improved communications, most interviewees reported that organizational politics had not been significantly influenced by ERP adoption. Admittedly, many interviewees suggested that the adoption of ERP had helped the clarification of responsibilities, which consequently reduced the frequency of a "blame and shame" culture developing, but some interviewees suggested that ERP would not impact on organizational politics. The interviewee from C6 suggested that as ERP did not cover every aspect of organizational operations, there was still room for human discretion, and so room for politics. The result here is in line with the work of Koch and Buhl (2001) that suggested that the adoption of ERP per se has limited influences on the cross departmental team working.

In sum, the qualitative data would seem to confirm that ERP adoption leads to
improved communication, but evidence of other expected improvements in horizontal integration was lacking. It is important to emphasize the importance of project leadership and the role of senior management here. If there is pressure from top management to keep working practices the same then it is to be expected that there will be little change in horizontal integration, and cross departmental relationships might not be changed at all (Koch and Buhl 2001). The results from both the qualitative and quantitative study support Amrani et al (2006) who argued that top management support and involvement in ERP implementation is essential in order to realize the benefits.

7.4.5 Summary

It would seem then that the mere adoption of ERP will not make significant changes to an organization's configuration; restructuring of the enterprise will only occur when ERP adopter's recognize the potential benefits to be gained from ERP. Whilst it is possible for organizations to delegate and decentralize their decision making processes, in China, the delegation, or otherwise, of decision making rights reflects the leadership style in a company. Chinese companies do undertake the standardization of working practices and find the clarification of responsibilities and procedures useful. In some companies, standardization has changed interdepartmental communications for the better.

7.5 Influence of ERP on Flexibility

It was hypothesized in this study that the adoption of the ERP will provide managers with more timely and accurate information (Booth et al. 2000; Yusuf et al. 2004) and this in turn will enable the organization to respond flexibly to change. The outcomes of the quantitative data analysis suggested that organizational flexibility was associated with ERP benefits, that is, the more benefits an enterprise reaps from ERP adoption, the more flexible it becomes.
## Chapter 7—Qualitative Research Findings

### Table 7.6: Summary of Interview Data on Flexibility

<table>
<thead>
<tr>
<th>Company</th>
<th>Flexibility improved by ERP System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes such as the reduction of production cycle, ERP help to normalize and standardize the manufacturing practices.</td>
</tr>
<tr>
<td>2</td>
<td>Yes, by dint of the information provided by ERP, company can flexibly respond to market and effectively control the organization.</td>
</tr>
<tr>
<td>3</td>
<td>No, and the interviewee suggested that their ERP project was not successful.</td>
</tr>
<tr>
<td>4</td>
<td>Yes, company can easily deal with the production and operation by dint of the information provided by ERP.</td>
</tr>
<tr>
<td>5</td>
<td>Yes, the timely and accurately provided information by ERP can help management better respond to market.</td>
</tr>
<tr>
<td>6</td>
<td>No significant changes. Interviewee suggested that before the adoption of ERP, they had set up good working practices which can help them quickly respond to market. He suggested that those working practices were not changed by ERP.</td>
</tr>
<tr>
<td>7</td>
<td>Yes, the interviewee suggested that the improved efficiency help them to better cope with the customer requirements.</td>
</tr>
<tr>
<td>8</td>
<td>Yes, better production management and effectively coping with the crisis such as SARS (this is a Pharmaceutical company)</td>
</tr>
<tr>
<td>9</td>
<td>Yes, streamlined and rationalized processes, better working practices from ERP, and timely information all enable quality decision makings in response to the market changes.</td>
</tr>
<tr>
<td>10</td>
<td>Yes, it helped on the accumulation of expertise and the provision of better working practices</td>
</tr>
<tr>
<td>11</td>
<td>No, because this is a SOE and its production volume has been given by State. Flexibility is not valued in this company.</td>
</tr>
<tr>
<td>12</td>
<td>Yes, the timely management information, the streamlined processes, and modularized operation help management to better cope with the required changes.</td>
</tr>
<tr>
<td>13</td>
<td>Yes, greatly improved production flexibility and ERP offered versatile means of organizational control.</td>
</tr>
<tr>
<td>14</td>
<td>Yes, because ERP provided timely and accurately information with regards to the whole processes and thus management can easily deal with the problems emerged. But, the interviewee suggested that ERP places more limit and control points for lower level staff and thus limits their flexibility.</td>
</tr>
<tr>
<td>15</td>
<td>Yes, the information provided by ERP can help them get clearly understanding of their operation and trace the problems in processes.</td>
</tr>
<tr>
<td>16</td>
<td>Yes, it helped to reduce production cycle and to cope with large volume of orders without the increase of human power. More importantly, the information provided by ERP can help to quickly trace and deal with problems.</td>
</tr>
<tr>
<td>17</td>
<td>No, interviewee suggested that ERP places too much limit on the individuals.</td>
</tr>
<tr>
<td>18</td>
<td>No, the interviewee suggested that the company was enjoying great flexibility all along, without and with ERP.</td>
</tr>
<tr>
<td>19</td>
<td>Yes, while the interviewee suggested that ERP can place some limitation on flexibility, e.g. you must do your job step by step, this can also benefit whole organizations due to the improved working practices and the shared information.</td>
</tr>
<tr>
<td>20</td>
<td>Yes, the standardized working practices, procedures and processes help management to quickly respond to market.</td>
</tr>
</tbody>
</table>
Chapter 7—Qualitative Research Findings

As it can be seen in Table 7.6, the majority of interviewees acknowledged that the adoption of ERP can help to improve organizational flexibility and production flexibility. As expected, this increase in flexibility is enabled through access to timely and accurate information which helps management to quickly identify any problems and so respond promptly to the market changes. At the same time, the embedded working practices of ERP can also help companies to streamline and standardize their processes and thus easily manage operational issues more effectively.

Some interviewees commented that ERP adoption places more limit on staff due to the large amount of control points set in the ERP processes. Consequently, staff had to undertake tasks step by step, see for example, C14. But the respondent of C12 commented that although some groups of employees in the lower ranks had less flexibility in how they undertook their work, the organization as a whole gained flexibility through access to better information and decentralized decision rights.

In sum, the qualitative data suggested that at the regional and individual level, although they can get timely and accurate information, their actions have to be executed according to standardized ERP practices (Oliver and Romm 2002). At the organizational level, ERP seem to help improve the organizational flexibility (Keller and Teufel 1998). The results here then lend support for hypothesis 5.

7.6 The Importance of ERP Benefits

Measuring the impact of IT on organizational structure is not an easy task. Past studies have tended to focus on the relationship between the physical scale of the IT implementation and the resulting decentralization (Pfeffer and Leblibici 1977). However, the fast development of IT has provided organizations with many diverse possibilities which have different implications for organizational change. Thus, only considering the physical scale as a means of measuring the impact of IT prevents us from getting a clear understanding of the relationship between IT and organizations. The outcomes of this study would suggest that measuring the ERP benefits delivered to the adopters is a more useful approach.

The outcomes from the quantitative data analysis provide strong evidence that ERP benefits are linked closely to the different dimensions of organizational structure. For example, ERP benefits, but not ERP physical scale, are found to be significantly associated with an organizational effort to reduce the span of control of managers.
Chapter 7—Qualitative Research Findings

At the same time, the qualitative data also provides strong support for the outcomes of the quantitative data analyses. As illustrated in Section 7.4, the changes to organizational structure made as a result of ERP adoption reflect the results of the T test discussed in Chapter 6. The qualitative data shows that that the adoption of ERP does help an ERP adopter to standardize working practices and processes, and the outcomes from the T test suggests that the mere adoption of ERP can make significant differences to organizational standardization. By contrast, the qualitative data failed to fully support the notion that ERP adoption will reduce organizational centralization and influence an organization's configuration. The T test results had also suggested that the adoption of ERP will not make significant differences to these two structural dimensions, but the outcomes from the correlation analysis had suggested that nearly all the structural dimensions did have significant associations with ERP benefits.

The interview data does offer some insight into the significance of ERP benefits too. For example, in C18 where the ERP project to some extent had failed to deliver organizational information and communication benefits, it was found that the organizational structure had not been changed and that consequently, in order to better manage their interdepartmental relationships, they had set up a special coordination team to coordinate across different departments. Furthermore, in C17 the project was initially considered a failure and this was reported as being due to a lack of commitment from senior staff. But as senior management realized the usefulness of the ERP system and committed to it, a second phase of the project proved to be more successful after the management changed their organizational structure in order to make full use of ERP system.

The interviewee from C8 clearly commented that, only after a period of using ERP and realization of its benefits did they reduce their hierarchical levels.

"At beginning, there was no reduction in the levels. For example, in the accounting department, there were 10 accounting staff there, but after the implementation of ERP only a few members of staff were needed to complete the jobs. With such a great improvement of the efficiency, it is inevitable that there will be a reduction in management levels. This did take some time; you can't expect that the management level could be reduced immediately after the adoption of ERP".

Similarly, the interviewee from C7 suggested that it was the improved information
Chapter 7—Qualitative Research Findings

for decision making, resulting from ERP adoption that enabled the decentralization. The interviewee from C2 also commented that change took time:

"...our integration with ERP system is getting better and better. And the longer we use ERP, the better we integrate with the ERP system. In fact, I found that we can little by little find more functions offered by ERP that we never expect before the adoption of ERP".

This would suggest that ERP benefits are the most effective predictor of organizational changes. The outcomes would suggest that no matter how large the physical scale of the ERP implementation, benefits will not be fully realized until restructuring has been undertaken in order to make full use of ERP system.

7.7 Chapter Summary

The chapter presents the findings from the qualitative data which aimed to provide understanding of ERP projects in China and to integrate the quantitative findings with the qualitative data. The qualitative data offered insight into Chinese ERP practices and for the first time provided an overall the understanding of organizational impact of ERP in Chinese companies.

Firstly, the qualitative data was examined to provide insight into the structural impact of ERP and it was found that the adoption of ERP can act as a driver in an organization's efforts to standardize its working practices and to improve cross departmental relationships. Although it was expected that organizational configuration would be changed by ERP, it was found that this was an area of particular sensitivity for the Chinese and that reducing staff numbers and flattening of the organizational structure was more dependent on the leadership style of the senior management team than on the adoption of ERP. Managers often chose to keep the structure of the company the same. This approach was also reflected in the approach to decentralization taken by managers. Some companies had taken advantage of the new processes introduced through the ERP system to decentralize decision making rights and had been rewarded with more organizational flexibility and so had reaped more of the benefits. Other interviewees reported that their degree of centralization had not changed and such companies did not seem to have reaped as many of the potential rewards for ERP adoption. The view expressed by managers was that the ERP system was adopted for 'external reasons' [a decision
Chapter 7—Qualitative Research Findings

by Head Office, or a Government directive] and so the strategic impetus seemed to be lacking. Some of these ERP adopters may simply require more time to realize and recognize the ERP benefits and thus change their organizational structures accordingly. He (2004) has also suggested that Chinese ERP projects can lack strategic planning, which might account for the lack of changes to some structural dimensions such as configuration in Chinese companies.

Finally, the qualitative data also explored the influences of ERP on organizational flexibility. It showed that the majority of interviewees acknowledge the positive contribution of ERP on organizational flexibility through the provision of timely and accurate information, and also increased standardization from the embedded working practices and procedures. But it must be pointed out, that this organizational flexibility is gained at the expense of losses of individual flexibility. Staff must follow the setup procedures and steps in order to complete their tasks.

Following the presentation of the qualitative data analysis, the next chapter, Chapter Eight, is then in a position to conclude the whole study, by virtue of the quantitative and qualitative data analyses.
Chapter 8

Discussion and Conclusions
Chapter 8—Discussion and Conclusions

8.1 Introduction

Starting from the main research aim, the research model and the hypotheses, this study integrated the quantitative and qualitative research methods with the express purpose of exploring the relationship between ERP and organizational structure from different sources of data. While the quantitative questionnaire survey provided comprehensive cross-sectional data, the qualitative study was designed to complement, and to expand upon the findings from the quantitative data analyses (Bryman 2006). In particular, the data provided by the qualitative interview enabled this study to explore the reasons for any divergences between the original hypotheses and the findings from the quantitative data analysis. Having adopted a 'mixed method' study (Saunders et al 2000), it has become clear that the quantitative and qualitative data analyses have played different roles in the course of exploring the relationship between ERP and organizational structure. That is, the substantive findings come from the quantitative method, whilst the qualitative method provides complementary means for exploring the important issues that the quantitative data can't readily handle.

Having now presented and reviewed the results of both the quantitative and qualitative data analyses, the aim of this chapter is to conclude this research study, by summarizing the study's key results and findings, before critical reviewing its major contributions, and then articulating its implications for theory and practice. However, as an exercise in social research, this study also suffered from some limitations. Thus, in addition to presenting the conclusions of this study, it is also necessary to clarify the research limitations and suggest further research aiming to improve the knowledge in this area. Accordingly, this chapter is further structured into a further three sections. Section 8.2 provided a brief review of the research aim and research findings. Section 8.3 then aimed to detail the contributions of this study. Finally, in Section 8.4, the implications of this study are presented, before critically reviewing its limitations, and then offering some suggestions for further research areas, which might help to build-upon and develop some of material presented in this thesis.

8.2 Review of Research Aims and Findings

With the purpose of contributing to existing knowledge relating to the organizational impacts of ERP, this study was undertaken starting from intensive literature survey.
Chapter 8—Discussion and Conclusions

The field data was collected over a one and half year period, which provided rich sources of information with respect to the uptake, application and impacts of ERP, within Chinese manufacturing organizations. It was found that most hypotheses, of this study, were supported, to a greater or lesser extent, through the quantitative and qualitative data. Furthermore, the qualitative data, while focusing on the organizational impact of ERP, provided added value by exploring the ERP adoption practices in the Chinese context. This valuable qualitative data provided important ‘meaning’ and/or explanations for understanding the organizational impact of ERP. Therefore, this section is then to briefly review the original research aims, before presenting a summary of the study’s key findings.

8.2.1 Research Aims and Objectives

This study aimed to generate more comprehensive understanding of the organizational impacts of IT, in general, and ERP, in particular. While some previous studies have been undertaken to explore the organizational impacts of IT, these efforts didn’t provide the area with any clear understanding of how IT will influence the different dimensions of organizational structure. In particular, the deficiencies of previous studies of the structural impacts of IT will potentially prevent organizations from gaining the full benefit of an ERP implementation. This is because organizational structure plays a uniquely important role in effective organizational control (Hall et al. 1967; Galbraith and Nathanson 1978; Child 1984; Herath 2007), and thus organizations cannot afford to make any mistakes in this area. Therefore, this study’s main research aim was to provide comprehensive insights into this critical topic. In order to better manage this overall research aim, five distinct, yet complementary, research objectives were derived with the purpose of exploring the associations among organizational strategy, structure, ERP and flexibility. In the following parts of this chapter, the research findings, corresponding to each research objective, are presented and reviewed.

8.2.2 The Impact of Organizational Strategy on Structure

Miller and Friesen (1980) suggested that the inclusion of more variables can potentially shed important insight into the specific relationships between organizational elements. Thus, it was proposed to include organizational strategy with the purpose of exploring the role of organizational strategy for the shaping of organizational structure. Previously, the link between the organizational structure and strategy has been built on the different theoretical frameworks such as the
strategy typologies offered by Miles and Snow (1978), the different configurations offered by Mintzberg and colleagues (Mintzberg and Waters 1982; Mintzberg 1984; Mintzberg and McHugh 1985; Mintzberg 1991; Mintzberg et al. 1998), and the generic strategies offered by Porter (1980; 1985).

Of these, the strategy typology provided by Miles and Snow (1978) offered a theoretical framework with the most detailed description of corporate strategies, corresponding organizational structures and the strategic emphases of different typologies. More importantly, the effectiveness of this framework has been empirically examined previously (Doty et al; 1993). Moreover, as the 'Prospector' and 'Defender' strategies are placed at extremes on a continuum, with the 'Analyzer' and 'Reactor' being at the middle, it makes Miles and Snow (1978) framework more readily operationalizable, for the purposes of quantitative study. Accordingly, it was proposed that a 'Prospector' organization would tend to flatten, decentralize and standardize its structure with emphasis on horizontal integration.

The relationships between organizational strategy and different structural dimensions were intensively tested through the quantitative data analyses. The qualitative data was mainly focused on exploring the 'social meaning' of this new technology in organizational life. The quantitative data analyses confirmed the inherent relationship between organizational strategy and structure. In particular, the positive associations between organizational strategy and the span of control and the negative association between strategy and levels of hierarchy suggest that 'Prospector' organizations will tend to adopt a flatter structure with extended span of control (Miles and Snow 1978). Furthermore, a negative association was also detected between organizational strategy and the degree of centralization, which suggests that 'Prospector' organizations tend to decentralize their decision making, and, in so doing, empower their staff in order to quickly respond to external changes (Miles and Snow 1978). At the same time, the significant associations between organizational strategy and horizontal integration denotes that 'Prospectors' place a strong emphasis on strong horizontal relationships across functional departments, which also supports Miles and Snow's (1978) hypothesis. However, the significant and positive association between organizational strategy and standardization tells a different story that diverges from Miles and Snow (1978) original theories. The quantitative data analyses found that 'Prospector' organizations have a tendency to adopt more standardized structures; a result which is in line with Child (1973b; 1977), as well as other more recent writers (Kim et al. 2003; Lin and Germain 2003).
Chapter 8—Discussion and Conclusions

These authors have argued that standardization and centralization are the two important aspects of organizational control (Child 1973b; Child 1977; Kim et al. 2003; Lin and Germain 2003); in that a more standardized organizational structure will facilitate loose control of decision making.

In sum, the data analyses suggested the significant influences of organizational strategy on structure. In particular, a 'Prospector' strategy will prescribe a flatter, more decentralized and more standardized organizational structure with a strong emphasis on effective horizontal integration.

8.2.3 The Impact of Strategy on ERP Deployment

Generally speaking, there are two reasons that motivated this exploration of the relationship between organizational strategy and ERP scale. In addition to providing a more holistic view of the different organizational elements, as argued above, the testing of this relationship can also add value to the previous studies of ERP systems. To date, there have been a large number of studies documenting the reasons and motives for ERP adoption (Jaikumar 1986; Callaway 1999; Davenport 2000a; Oliver and Romm 2002; Umble et al. 2003), but few of them have explicitly and empirically examined the relationship between organizational strategy and ERP. Consequently, it is desirable to explore this relationship in this study, which can provide a clearer picture of whether it is the documented motives or the underlying organizational strategy that most strongly influence ERP adoption. Then, following the argument of Miles and Snow (1978), this study hypothesized that the Prospeter organizations will have a tendency to adopt ERP systems with a larger physical scale.

Both qualitative and quantitative methods were employed to investigate the relationship between organizational strategy and ERP deployment. Surprisingly, the quantitative data results suggested that organizational strategy doesn't have any significant influence on the initial decision to implement ERP. Similarly, the quantitative data analyses didn't detect any significant association between ERP scale and organizational strategy, which means that organizational strategy, has no significant influences on the scale of an ERP implementation. By contrast, there was a significant and positive association between organizational strategy and the realization of ERP benefits which suggests that 'Prospector' organizations are more successful in their adoption of ERP, which might result from the special capabilities
At the same time, the qualitative data offered a potential explanation for the lack of any significant relationship between organizational strategy and the ERP implementation's physical scale. It found that half of the interviewed companies have been primarily influenced to adopt their ERP systems in response to external pressures, rather than in support of their own strategic positioning. Many companies have adopted ERP because their headquarters explicitly requested them to do so, or in response to their parent company’s policies. Other interviewees have suggested that ERP adoption was in response to a request from their company’s key customer(s). Yet another company surprisingly adopted their ERP because its general managers wanted to be seen to follow ‘management fashion’. Finally, two interviewees suggested their adoption of ERP was in support of their latest efforts at ‘going public’: that is, to list their shares on stock exchange. All of these external requirements for ERP adoption might suggest that in China, some companies have adopted their ERP systems without the explicit alignment of their ERP projects with their corporate strategy. This result corresponds to some previous studies that have suggested there is a lack of strategic planning of ERP adoption, in many cases (Muscatello et al. 2003; Wainwright and Waring 2004).

In sum, the quantitative data analysis provided limited support for hypothesis 2 and suggested that organizational strategy is only significantly associated with ERP benefit variables. The qualitative data provided further insight that suggested that in a Chinese context, ERP was adopted, in many occasions, in response to external requirements, which may explain the non-significant association between organizational strategy and ERP adoption.

8.2.4 The Impact of ERP Deployment on Organizational Structure

Due to the inherent limitations associated with prior studies of the organizational impact of IT, and due to the absence of any explicit focus on structural impacts in more recent studies of ERP, this research focused primarily on developing a richer understanding of how ERP might influence the structural dimensions of an organization. The growing importance of effective organizational structure and IT for the modern business organization underlines the importance of this study.

It was recognized that the many deficiencies in the definition of IT measures used in
Chapter 8—Discussion and Conclusions

Prior studies was potentially a source of their inconsistent findings. Consequently it was decided to use a basket of complementary measures to model the technological artefact. Ultimately, for this study, the deployment of ERP was measured in the following three ways: whether, or not, ERP had been adopted; the extent to which it has been diffused across the organization; and the extent to which it has delivered benefits.

Following the quantitative data, significant associations were detected for the relationship between ERP benefits and organizational configuration, which denotes that successful ERP projects have the potential to flatten and downsize an organization. By contrast, the quantitative data analyses didn’t find any significant association between ERP coverage and the organizational configuration variables. However, the qualitative data analyses, suggested a rather different story. It was found most of interviewees believed that their organizational configurations had been left untouched. Further investigation found that before the adoption of ERP, many of these organizations had already undertaken BPR or initiated a downsizing initiative. Moreover, since configurational changes are not a prescribed part of an ERP deployment, neither the ERP consultants nor the company’s senior managers wanted to actively engage in sensitive configurational changes. Probably, and as confirmed by one interviewee, the potential of configuration change, resulting from ERP adoption, can only come into being after the top management have a further understanding of the ERP benefits and its potential.

At the same time, it was found that, ERP adoption, physical scales of ERP and ERP benefits all have significant influence on organizational standardization. Moreover, the qualitative data analyses confirmed the influences of ERP adoption on organizational standardization. It was found in order to run ERP system, ERP adaptors have had to standardize their working practices, processes and procedures.

Similarly, significant influences on horizontal integration from ERP adoption were found during the quantitative analysis. Also, the qualitative data suggested that the adoption of ERP can help cross-functional staff to effectively communicate and to better coordinate their tasks with each other. However, most interviewees suggested that the adoption of ERP does not significantly influence organizational politics and full process integration across organizational functional departments remains difficult.
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Finally, the outcomes of this study also provided more substantive support for the argument that IT can lead to a more decentralized organizational structure (Pfeffer 1978). It was found through the quantitative data that both ERP benefits and ERP coverage can have negative influences on the degree of organizational centralization. The non-significant difference for organizational centralization between ERP adopters and non-adopters implied that the mere adoption of ERP does not influence organizational centralization. Finally, some of the interviewees suggested that the adoption of ERP had helped them to standardize their working practices, gain better control of their organizations and decentralize decision making. But, changes to organizational centralization were usually not compulsory during ERP adoption and interviewees from other companies [mainly those working for SOEs] suggested the adoption of ERP had not changed their decision making process, which means the decentralization potential, induced by ERP adoption, were not realized by some ERP adopters.

In sum, data analyses detected the significant influences of ERP deployment on four structural dimensions. While it was found that ERP can significantly and strongly influence organizational standardization and horizontal integration, its influences on centralization and configuration are limited. The qualitative data suggested that although ERP adoption offers the potential to flatten, downsize and decentralize their organizational structure, some of the interviewed companies failed to realize or recognize these potentials.

8.2.5 The influences of Organizational Structure on Flexibility

The influence of organizational structure on the degree of flexibility has been documented by many studies (Child 1972; Hannan and Freeman 1977; Mansfield 1984; Cyert and March 1992; Strader et al. 1998; Child and McGrath 2001; Dibrell and Miller 2002; Fitzgerald and Siddiqui 2002). However, following the line of argument of Mile and Snow (1978) that 'Prospector' organizations will commonly adopt a flatter, more decentralized, less standardized, and better horizontally integrated organizational structure, in order to pursue more organizational flexibility, the research model of this study entailed an empirical re-examination of the relationship. Moreover, there was also a clear need to provide a more systematic examination of how different structural dimensions combined to influence organizational flexibility. More importantly, most of past theoretical works have focused on linking organizational structure with organizational flexibility, and in so
doing have rather ignored production flexibility. Consequently, this study argued that as production flexibility can also contribute to the performance of a whole organization (Fitzgerald and Siddiqui 2002), it should be considered along with organizational flexibility within the quantitative study.

The detailed hypotheses assumed that a flatter, more decentralized and more standardized organizational structure, with strong horizontal integration can potentially facilitate more flexibility. Following a detailed quantitative analysis, it has been found that organizational structure does indeed have significant impact on the degree of flexibility to be realized. More specifically, the quantitative data analyses suggested that a flattened and/or downsized organizational structure can potentially generate higher degrees of organizational flexibility. A more decentralized and standardized organizational structure can also contribute to organizational flexibility. In addition, it was found that a better integrated horizontal relationship had a positive influence on organizational flexibility. Finally, the confirmed relationship between organizational structure and organizational flexibility then implied that the degree of organizational flexibility, prescribed by organizational strategy, is partly realized through an appropriately designed organizational structure. This then further suggests the effectiveness of taking a configurational view of organizational elements.

By contrast, production flexibility is found to be significantly associated with barely any of the structural dimensions, which is perhaps not surprising as production flexibility is likely to be primarily impacted by the design and behaviour of only a small sub-set of the organization, namely the production, or manufacturing department (Fitzgerald and Siddiqui 2002). This was an important result as it confirms that the concepts of organizational flexibility and production flexibility are significantly different. Thus, it seems to be reasonable to suggest that future research studies should treat production flexibility and organizational flexibility separately. In sum, the data analyses confirmed the significant influences of organizational structure on organizational flexibility but, not production flexibility.

8.2.6 The Impact of ERP on Flexibility

Finally, although there have been some theoretical works (Keller and Teufel 1998; Davenport 2000b) aiming to link ERP with organizational flexibility, few empirical studies have been undertaken to investigate their relationship. At the same time,
since the research model of this study followed the line of argument of Miles and Snow (1978), it was desirable to explore how flexibility was influenced by ERP adoption. Keller and Teufel (1998) argued that the modularized ERP system provided a plug in/out utility for the ERP adopter and thus has positive influences on organizational flexibility. They further argued that, the standardized working processes, procedures and practices can also enable EPR adopters to flexibly react to the environmental changes. Moreover, Davenport (2000b) suggested that ERP can integrate the organization together, which can then help improve organizational flexibility. Following these arguments, this study hypothesized a positive relationship between ERP and flexibility.

Both the qualitative and quantitative data analyses provided some empirical support for the hypothesized relationship. More specifically, significant associations were detected between ERP benefit variables, but not the ERP scale variables, and both organizational flexibility and production flexibility. This suggests that a successful ERP implementation can exert significant and positive influences on both organizational flexibility and production flexibility. The significant influence on production flexibility might directly result from the powerfulness of the ERP package's MRP module which allows production levels to be readily adjusted in response to changes in demand.

Importantly, the lack of any evidence to suggest that the physical scale of the ERP implementation might influence organizational flexibility provides a strong argument against using the scale of ERP adoption as the only measurement of the impact of IT. This is because the outcomes from this study suggest that using ERP benefit variables, as an explicit measure of ERP success, are better predictors for a change of organizational flexibility. This may be because it is only once the system is successfully delivering benefits, such as improved internal information management (Hall 2002; Voordijk et al. 2003), that the organization will be able to respond more flexibility, to environmental changes.

In addition to above quantitative data analyses, the qualitative data also provides strong support for the hypothesis. It was found that most interviewees agreed with the positive influences of ERP adoption on their flexibility. Interviewees suggested that the normalized working procedures, the rationalized processes, and better working practices assisted them in the reduction of production cycle and quick response to the market. Furthermore, the timely and accurate provision of
information can also enable the ERP adopters to flexibly respond to external changes. However, some interviewees also suggested that the adoption of ERP placed more control points for individual staff, and thus limits an individual's flexibility. Although this study was not focused on exploring the influences of ERP on individual staff, this insight into the influences of ERP on an individual's working life is worth pointing out.

In sum, both the quantitative study and qualitative study provide empirical data in support of the hypothesized positive influences of ERP adoption on flexibility. At the same time, the outcomes of the quantitative data analysis remind us of the effectiveness of ERP benefit variables as the predictors of the organizational changes.

8.2.7 Summary

In this study the relationship between organizational structure and IT, and ERP in particular, is revisited. Having critically reviewed past studies, this study has aimed to build on and develop their findings, but adding more factors (Miller and Friesen 1980), to generate a richer picture and a deeper understanding. More specifically, this is one of first empirical studies to focus on the structural impacts of ERPs. The study confirms that ERP adoption can strongly influence all structural dimensions: in sum, it has been found that the adoption of ERP can result in a flatter, more decentralized, more standardized structure, with better coordinated inter-departmental relationships.

8.3 Principle Contributions of This Study

Having briefly reviewed the research aims and findings, the present section aims to present the contributions of this study. In total, there are five major contributions associated with this study, which have been detailed in the following subsections.

8.3.1 The Impact of IT on Organizational Structure

In this study, the organizational impact of ERP in particular, and IT in general, has been investigated through both the quantitative and the qualitative study. In comparison to previous works, this study has generated a more comprehensive set of findings. Previous work investigating the impact of IT in organizations can be criticized in terms of how both the dependent and independent variables have been
modelled. With regard to the modelling of the dependent variable⁶ – namely organizational structure – it is the potential of information technologies to modify the centralization of decision making that has been the focus of the most persistent and intensive scrutiny [See Argyres, 1999; Robey, 1977; Pinsonneault and Kraemer 1993a; Hitt & Brynjolfsson, 1997]. Others have also included work on the standardization and formalization of working practices and procedures [See Zeffane, 1989; Winjhoven & Wassener, 1990; Spanos et al, 2002], but the impact of IT on other important dimensions of organizational structural - such as the span of control, the degree of horizontal integration, or the number of hierarchical layers - has been neglected. In addition, existing studies have focused on modelling the adoption of technology, rather than its successful operation. Against this backdrop, it was desirable to conduct a study which focused upon a single, clearly defined technology, which could then be modelled using a portfolio of mutually supporting measures, such as extent of diffusion, regularity of use, success of operation etc.

The outcomes of this study can contribute to this area in two important respects. Firstly, this study confirmed the inherent and significant influences of IT on organizational structure. The introduction of information technology, in this case ERP systems, can lead to a flatter, more decentralized, more standardized and better horizontally integrated organizational structures. The study also confirmed the negative association between the degree of centralization and level of standardization and so provides convincing, empirical evidence to contribute to the long running debate with regards to the influence of IT on organizational centralization [Refer to Table 2.1]. Moreover, as one of the few works exploring the influences of IT specifically on horizontal integration via a quantitative survey, this study provides convincing evidence that the adoption of ERP can have a significant improvement on the horizontal integration of a company by providing more effective communications, better coordinated working practices, and more clearly defined responsibilities. This further implies, that in order to gain the maximum benefits from an ERP implementation, a proactive effort will be needed in order to modify the organizational culture, particularly with respect to the evolution of a culture that supports cross-functional integration (Koch and Buhl 2001).

A second contribution to the debate about the influence of IT on structure made by this study, is that it is the success of the implementation, rather than its scale that

⁶ The independent variable is what is varied, and the dependent variable is the response to the varied independent variables that is measured (Kerlinger 1986).
has been found to have the most marked impact upon structural design. In this study, when comparing the influences on organizational structure through ERP adoption, its physical scale, and its ability to deliver benefits, the most significant associations have been detected between the ERP benefit variables and organizational structure. Only if researchers can model and measure the technical artifact in more effective ways, such as its successful adoption, can they generate more convincing and convergent research findings. Most importantly, the outcomes of this study provide direct and comprehensive quantitative data to support the findings, as opposed to the few prior case studies, which have lacked any generalization power (Hollis 1994; Tashakkori and Teddlie 1998). In sum, the outcomes of this study provide a number of important insights into the influence of IT on organizational structure.

8.3.2 The Impact of ERP on Organizational Structure

Having established the need to revisit the issue of the structural impacts of IT, the next big decision to address was which particular technology to focus upon. Once more, the literature was very helpful in establishing a clear candidate, namely the ERP package. ERP is typically acquired in the form of packaged software, with integrated modules that support all major business functions across an organization, such as production, distribution, sales, finance and HR management. It was envisaged that ERP technology would make an excellent focus for this study, as it present a single and well defined type of software application, which is increasingly common (Markus et al, 2004). ERP software also has a recognized potential to engender significant organizational impacts (Fahy 2001; Newman and Westrup 2005). Doherty et al (2006) have also argued that ERP systems have a relatively low ‘interpretive flexibility’ and so it was expected any resultant impacts across different companies would reflect a reasonably high degree of commonality. Following the above arguments, this study has explored the potential impacts of ERP on four structural dimensions, namely organizational configuration, standardization, centralization, and horizontal integration, and in so doing, has made the following important contributions.

Firstly, in this study, the quantitative data shows there is a significant association between ERP and organizational configuration variables, which indicates that the adoption of ERP can help to flatten organizational hierarchy and to reduce organizational size. However, the qualitative data uncovered that many ERP
adopters didn't recognize or experience the impact of ERP. The interviewees suggested several reasons why companies may fail to experience all the potential benefits of ERP, including some respondents suggesting that they had made configuration changes before the ERP adoption and so no significant changes were necessary after the implementation of ERP. However, other interviewees suggested that as organizational configuration changes are not explicitly recommended for ERP adopters, and due to the sensitivity of any such changes, ERP consultants will not commonly suggest this change. Therefore, these outcomes suggest that it is necessary for the top management to fully understand and plan ahead for any configurational changes and that their involvement is essential to realizing the full benefits of ERP adoption.

Secondly, the results of this study provided important and comprehensive empirical insights into the influences of ERP deployment on the horizontal integration achieved, one structural dimension that has drawn the attention of many previous conceptual contributions (Galbraith 1994; Davenport 2000a; Dibrell and Miller 2002). The emphasis of ERP on the horizontal processing and flow of information and materials suggests that it will inevitably influence the degree of horizontal integration (Davenport 2000b; Amrani 2006). Moreover, in the ever changing business environment, the horizontal integration plays important role for the success of organizations (Davenport 2000b). Unfortunately, few empirical works have been done to investigate how the potential of ERP might impact horizontal integration. Both the qualitative and quantitative data analyses of this study indicated significant and positive influences of ERP on organizational horizontal integration. At the same time, qualitative data analyses reveal that whilst ERP can improve organizational communication and coordination, it has limited power to modify any underlying political issues between departments.

Thirdly, both the quantitative study and the qualitative study have confirmed the inevitable influence of ERP on organizational standardization. More specifically, it has been found that ERP adoption will significantly strengthen the degree of standardization of business processes and working practices, and in so doing, will limit the extent to which groups and individuals can follow their own initiative.

Fourthly while quantitative data suggested that ERP adoption lead to a more decentralized organizational structure, the qualitative data suggested that some companies didn't change their decision making structure due to the sensitivity of this
issue and due to the non-explicit requirements for the change of the degree of centralization. These results together suggested that since organizational working practices were getting more standardized and then easily controlled, it is necessary for the "Prospector" organization to decentralize and delegate its decision making power in order to flexibly react to the environmental events.

In sum, this study provides timely and important empirical data investigating the structural impact of ERP adoption. Particularly and different from past studies, this research explored the influences of ERP on four organizational dimensions, which makes it possible to collate the influences of ERP on different structural dimensions.

8.3.3 The Configurational View of Organizational Management

In contrast to other schools of organizational studies, configurational approach\(^7\) provides the possibility of reconciling and integrating different ideas together (Mintzberg et al. 1998). The configurational view of organization offers insights into the state of organizational elements and their context (Mintzberg et al. 1998). Unlike the contingency school that focuses on single relationship, the holistic approach to organization studies can help capture a much richer picture of organization (Mintzberg 1991). Miles and Snow (1978) provided an influential and configurational framework (Mintzberg et al. 1998), the effectiveness of which had been supported by Doty et al (1993).

Up to now, there has been a distinct absence of any empirical works that tries to understand the ERP phenomena through a configurational perspective, which has created a gap in our understanding of the implications of ERP deployment for organizational strategy. As has been suggested, "the configurational approach should not, therefore, allow us to ignore the nuance of our messy world. We need fine-grained work that exposes the complex interrelationships among things" (Mintzberg et al 1998: P346). At the same time, Chinese management practices are still perceived to lag behind those of more developed countries (Huang and Palvia 2001). Consequently, the outcomes of this study provide an important and rich picture of the configurational view of ERP deployment in Chinese organizations.

\(^7\) Mintzberg (1998) argues that a configurational view of management focuses on the realized pattern of multiple variables, how these variables interact over time and how the pattern is related to various organizational outcomes (Delery and Doty 1996). Structural configuration in this study refers to the skeleton of the organization, measured by the hierarchical levels and the horizontal span of control.
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This study provided important empirical data in support of the effectiveness of the strategy typologies provided by Miles and Snow (1978), even in the Chinese context. Peng et al (2004) had focused on the link between ownership type and the strategy adopted; but in this study valuable insight is offered into the relationships between different organizational factors. The cluster analysis, a data reduction technique, successfully grouped all cases into two groups with distinct differences of structural dimensions, which is the exactly the same as the anticipated outcomes suggested by Mintzberg et al. (1998) that is, that the strategy typologies offered by Miles and Snow should be reduced to two, namely ‘Prospector’ and ‘Defender’. Thus, the outcome of this study to a large extent indicates the effectiveness and usefulness of this framework for grouping companies.

At the same time, the significant associations among the different organizational elements, including organizational strategy, structure, ERP and flexibility, also confirmed Miles and Snow (1978). More importantly, the uncovered relationships among strategy, structure, ERP and flexibility offer important and empirical insights into how to manage organizational changes for the transformation of organizations.

For example, ERP adoption can help standardize organizational practices in Chinese organizations where standardization is often lacking [See Appendix IX], and this reinforced standardization can provide the possibility of decentralized organizational decision making.

However, this study also identified one divergence between the empirical data and the argument of Miles and Snow (1978), which reminds the researcher of the requirement for further investigations. It was found that, in contrast to Miles and Snow (1978), standardization is positively associated with organizational strategy which means that ‘Prospector’ organizations do have a tendency to standardize their practices. When further looking at the relationship between standardization and organizational flexibility, it was found that a more standardized approach can lead to increased flexibility, which is also divergent from Miles and Snow (1978). Instead, the positive contribution of standardization on organizational flexibility has been argued by different authors. Nagarur and Azeem (1999) pointed out that for manufacturing organizations, standardization can help reduce the system complexity and consequently increase organizational flexibility. Similarly, Eckerson (1989) reported how standardization had helped big organizations gain economies of scale and serve customers. Such strategies have helped larger organizations to gain flexibility and responsiveness. In addition, Ramakumar and Cooper (2004)
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argued that standardization is important in order to achieve operational excellence and flexibility. Based on this, it is logical that ‘Prospector’ organizations should have a more standardized structure.

In sum, this study provides important and empirical data in support of the effectiveness and usefulness of the theoretical framework of Miles and Snow (1978) to Chinese management teams and can help them to prepare for the transformation potential to be brought by ERP adoption, this makes a useful addition to the configuration school of thinking, and in particular to the framework of Miles and Snow (1978). These outcomes have more significant implications, namely that the adoption of ERP demands strategic planning in order to gaining a full understanding of the influences of ERP on the realization of organizational strategy and the improvement of organizational performance.

8.3.4 The ERP Adoption in Chinese Organizations

Although there have been many previous studies with respect to the uptake and application of ERP within Western countries, few studies have been specifically focused on developing countries, in general, or China, in particular (Huang and Palvia 2001; Balsmeier and Nagar 2002). Moreover, those few studies that have explicitly focused upon the uptake and application of ERP implementation in China have not explicitly addressed its organizational impacts (He 2004). Moreover, it was envisaged that as ERP packages reflect a ‘western’ management philosophy (Boisot and Child 1996; Martinsons 2004), it would be interesting to ascertain whether any of the structural impacts or alterations might be needed to adjust to this ‘western’ model of best practice, embedded in the package.

In recent years there have been an increasing number of companies adopting ERP in China, and there are also some studies of ERP practices, which provide important contextual insights. For example, there are specific cultural differences between Chinese organizations and western ones such as the difference in financial practices (Wang et al., 2004), the high tolerance of uncertainty in Chinese organizations (Zhang et al 2005) and the problems associated with translation of the ERP modules from English to Chinese (Xue et al 2005). Furthermore, in the current economic climate Chinese organizations are often limited by the availability of their financial resources (He 2004) and so Chinese organizations have tended to adopt off-the-shelf software (Zhang et al 2005; Wang et al 2004) and thus had to change
their organizations according to the ERP processes (Wang et al 2004).

In this study, it was found that ERP system, an expensive IS that is not affordable for many small sized organizations (Muscatello et al. 2003; He 2004), has a special meaning to Chinese organizations. First of all, some Chinese organizations view ERP as just another IS without a strategic understanding of the benefits that can be gained through ERP implementation, which might partly account for the weak relationship between mere ERP adoption and changed organizational structural dimensions. The qualitative data also suggested that some companies adopted ERP in pursuit of 'management fashion'. One interviewee from a listed company also suggested that one important reason for them to adopt ERP is for 'going public'. Furthermore, many other companies, in particular the FOEs and SOEs, adopted their ERP systems to conform to corporate policy or in response to direct orders from their headquarters. As illustrated in Chapter 7, half of the interviewed companies adopted their ERP system in response to external pressures, rather than as part of their own internally derived strategic design.

Although it is true that many interviewed companies adopted ERP for external requirement, it can be found that for the other half of the interviewed companies, ERP was regarded as a powerful management information system that can help them to cope with the fast expansions of organizational scale and the levels of Chinese management practices (Woo 2007), which suggests that ERP can act as a medium for the propagation of Western management thinking, more research into this area would be both of academic interest and of benefit to ERP companies.

Finally, the investigation into the structural impact of ERP via qualitative data also discloses some special ERP practices of China. It was found that many interviewees suggested that the adoption of ERP give rise to much clearer lines of responsibility and defined working practices. As suggested by one interviewee [See Appendix IX], Chinese organizations commonly do not have strongly standardized organizational structures. Due to the recognized influences of ERP on organizational standardization, it can be reasonably argued that the adoption of ERP might then have more influence on the working practices of Chinese organizations.

In sum, this study, particularly through the qualitative data analyses, has provided important insight into the ERP adoption practices in China and uncovered some
significant differences between China and other countries such as its motives for ERP adoption.

8.3.5 Influences of ERP on Organizational Flexibility

In stark contrast to the times in which the bureaucratic organization was highly regimented, the ever changing business environment now requires organizations to be far more flexible (Perrow 1986; Child 1987; Galbraith 1994; Aldrich 1999). As a special class of information system, with unprecedented powers, ERP is expected have significant influences on organizational performance, in general, and with regard to the facilitation of flexibility, in particular. Already some theoretical contributions have discussed the potential influence of ERP on organizational flexibility (Davenport 2000b; Keller and Teufel 1999). However, to date, few empirical works have been initiated to study this potential. Consequently, the outcomes of this study provide important new empirical insights into how ERP can impact on organizational flexibility.

The quantitative study found that the ERP benefits can have significant and positive influences of organizational flexibility and production flexibility, which confirmed the hypothesis. At the same time, qualitative interviews were designed to see how ERP can change organizational flexibility. The interviewees suggested that the adoption of ERP can provide management with timely and accurate management information for enhanced decision making. In addition, the streamlined working processes and the better working practices, inherited through ERP adoption also enable them to quickly react to any internal or environmental changes. This has been found to enable organizations to reduce their production cycle.

However, during the interview process, it was also found that the adoption of ERP can also have deep implication for individual staff, which means that the freedom of individual staff to organize their own work has been greatly reduced. This is because the adoption of ERP introduces more control points for staff and thus they have to carry out their jobs according to the prescribed practices, procedures and processes. The different influences of ERP on management and on individual staff at a lower level in the organization might well deserve further research to gain better understanding of this phenomenon.

In sum, by investigating the influences of ERP on organizational flexibility, through
quantitative and qualitative data analyses, this study has provided important and timely new insights into this topic. More specifically, it has been found that, in the Chinese context, the adoption of ERP can have positive influences on organizational flexibility.

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8.4 Reflections and Implications

Having summarized the research findings and critically reviewed their contribution, this section aims to present the implications of the research, and reflect upon its conduct. In addition to the theoretical and practical implications of this study presented in sub-sections 8.4.1 and 8.4.2, the limitations associated with this study are presented in sub-section 8.4.3 and the scope for further research is presented in sub-section 8.4.4.

8.4.1 Theoretical Implications

One of the more interesting results of this study has been the increased insight into the need to use a variety of approaches to measuring IT implementations. The quantitative research findings provide convincing empirical evidence that the mere adoption of ERP and the physical scale of ERP implementation are not good predictors of the organizational impact of ERP. This might account for the divergent research findings in past studies with respect to the structural impact of IT. Therefore, the outcomes of this study would imply that in order to explore the impact of IT on organizational elements such as organizational structure, researchers should adopt an approach that measures IT benefits as well as the physical scale of the implementation of IT.

Additionally, this study found that production flexibility should be considered separately from organizational flexibility. As illustrated by the quantitative data analysis, organizational flexibility is closely related to the whole organization and thus is significantly influenced by the organizational structure. By contrast, production flexibility relates mainly to the behavior and activities of the production department, and thus organizational structure has no significant influence on it. By clearly separating these two kinds of flexibility, the outcomes of this study have been ultimately more effective.
Chapter 8—Discussion and Conclusions

More importantly, in this study, the research model, based on Miles and Snow (1978) typology, was confirmed by the empirical data. This then reminds us of the importance of the strategic and configuration view of ERP adoption. Unlike past installations of computer terminals or solutions, ERP adoption will involve pan-organizational changes. Thence, it is important to have an initial strategic plan to align organizational strategic objectives, organizational structures, and IS.

Finally, compared with past studies of organizational impact of IT, this research adopted a mixed methodology, which facilitates both empirical support for the relationship between organizational configuration and ERP through the quantitative study and added insight into the results of the survey through the qualitative study.

8.4.2 Practical Implications

In addition to above theoretical implications, this study can also shed light on the field ERP implementation practices.

Following the configurational approach, the outcomes of this study clearly stated the relationship among different organizational elements, in particular the relationship with ERP deployment. Thus the importance of strategic planning for an ERP adoption process and the transformation of an organization in order to achieve benefits becomes clear. The potential influences of ERP on organizational structure should be emphasized to ERP adopters. ERP adopters should understand the potential benefits to be gained through structural changes such as standardization and horizontal integration. This is of particular importance to Chinese companies. The qualitative data revealed the lower level of standardization that is common within Chinese companies. ERP offers the potential for increased horizontal coordination and process management which could be of particular value to Chinese companies wanting to improve their efficiency.

Finally, since ERP adoption can incur significant organizational change, it is essential that top management commit to supporting the implementation of the EPR system if benefits are to be realized.

8.4.3 Limitations

The study shares some shortcomings similar to most other exploratory studies. Although it is obviously desirous for the questionnaire to use only one specific
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sector within the manufacturing industry for the sample, rather than the manufacturing industry as whole, in order to control for the influences from external environments, due to the limited numbers of ERP adopters in China, the population has had to be chosen from all manufacturing companies. At the same time the diverse ownerships of population might also distort, to some extent, the research findings. In addition, the sample frame could be a source of potential sample frame bias as the companies that have adopted ERP were identified through web searching and thus didn't constitute a random sample. This is due to the failure to gain access to the client database of the ERP vendors, since ERP vendors regard this information as commercially confidential.

At the same time, during the qualitative data collection period, the time limits placed by the interviewees were another source of limitation for this study. Obviously, China is a country with its own distinct culture and presently little empirical research relating to ERP adoption practices has been done in China, which then demand more efforts and time to gain deeper understanding. But the interviewees, all high level managers, were so busy with their own jobs that gaining their time was a challenge. During the interviews too, various words and phrases could have been interpreted differently by different people. For example, the word ‘flexibility’ was interpreted slightly differently from person to person. Some interviewees emphasized flexibility at an organization wide level; others emphasized flexibility at an individual level.

Finally, the generalization power of the findings may be limited as well. It could be found that there are significant differences for the management practices between China and Western countries. The differences of the general economic environment and the management practices limit the predictive power of the findings of this study. This is due to the importance of context for social science studies (Giddens 1977; Mingers 2001; Hammersley 2005).

8.4.4 Future Research

The study finds significant association between ERP and structural dimensions. Its results lend strong support for Pfeffer and Leblebici’s (1977) and Zeffane (1989) argument that the IT system could potentially help decentralize organizational decision making. In addition to this, the study also confirms the significant association between ERP scale and benefits, and strategy and structural
dimensions. However more studies are required to gain deeper and richer understanding of ERP phenomena in commercial organizations.

At the same time, this study uncovered the negative effects of ERP on individual staff's initiative and thus limitation of individual flexibility. Due to the focus of this study, how ERP will influence on individual working life and also the flexibility of individual staff was not explored. Thence, it might be necessary to undertake further research to study how the ERP systems will influence individual working. By so doing, ERP adopters can have a full appreciation of the negative effects and thus try to reduce it.

Finally, since the data of the study is collected in China, the result of the study is limited for its generalization power. This is in particular true when there are significant differences between Chinese culture and management practices with Western ones. In view of this, a further study of how ERP could interact with structure to be conducted in western countries might be valuable and desirable because this could not only provide a reference for comparison purpose.

8.4.5 Personal Reflections

Due to the large volume of the work associated with this study, the whole research process generated a great number of insights into academic study for the researcher. It is the nature of the research process that it was only at the final stage of undertaking the PhD that the researcher gained a comprehensive understanding of the data that had been collected and of the implications of the data analyses. This underlined the importance of a researcher being careful and consistent throughout the whole of his/her research project. This approach ensures that the logic and coherence of the study is maintained.

In recent years, due to successful economic reformation, the Chinese economy is beginning to have its own voice in the world economy. Through cheap labour and a huge domestic market, most Chinese organizations are undergoing a quick expansion. Through undertaking the qualitative study and talking to many Chinese managers it quickly became apparent that the Chinese economy cannot rely on cheap labour alone and it will have to compete with other regions such as Korea, Japan, USA and Europe. The fast development of IT offers a double edged sword. For example, if Chinese companies do learn to better realize the benefits of ERP
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and apply more competitive management practices, capability can be quickly improved. However, the interview data shows that many Chinese companies are not yet prepared for this step, there is a significant skills gap to be addressed and this is the next great challenge for Chinese business managers.
References


Laframboise, K. and F. Reyes (2005). "Gaining Competitive Advantage From Integrating

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Dear Sir/Madam,

Re: The Impact of ERP on Organizational Structures: Learning the Lessons from Practice

As you will appreciate, over the past few years, there has been increasing concern about the design of organizational structures and how these might be affected by the organization's strategy and its use of information technologies.

Colleague and I are currently conducting new research that aims to explore the design of organizational structures within Chinese organizations. We believe that there are many important lessons and practical insights that can be learned from professional managers, such as yourself. I would, therefore, be grateful if you could spare me about ten minutes of your time to complete the short questionnaire that is attached to this letter. Alternatively, if you feel that there is someone else within your organization that is better placed to respond, could you please pass the questionnaire to them. All responses to the questionnaire will be treated in the strictest confidence, and no record will be kept to link a specific set of responses to the responding organization. No individuals or organizations will be identifiable in the summary reports produced from the survey.

An analysis of the findings of our research will be made available to all respondents of the questionnaire. If you require further clarification, or have any comments or suggestions with regard to this research, then please do not hesitate to contact my assistant who will stay in China during the time we collect data: Mr. Leitao Wang, telephone: 0546 7839777; Fax: 0546 7361555; email: wangleitao@hotmail.com

Many thanks for your kind cooperation and look forward to hearing from you soon.

Yours sincerely

Prof. Neil Doherty
Information Systems Research Group
Thank you for taking part in our survey about the factors that affect the design of organizational structures in China. If you would like to receive a copy of the summary report of the findings of this survey please provide your contact details below.

All of the information provided will be used for statistical purposes only, and your views will remain totally confidential and anonymous.

Please return the completed questionnaire in the Freepost Envelope

**If you would like to receive a copy of the summary findings of this research please fill in your contact details below.**

Name:

Address:

Email:

**Organizational demographics**

Q1 Which of the following categories best describes the manufacturing sector in which your company operates.

☐ Food, tobacco and drinks  ☐ Textile, clothes, leather and Luggage
☐ Electrical and electronic products  ☐ Pulp, paper and related
☐ Chemicals and related products  ☐ Machinery & Equipment
☐ Wood and wood-based products  ☐ Other (please specify below):

Q2 Approximately how many personnel does your company currently employ? ____
### Appendix I

#### Section A: Corporate Strategy

*Please indicate the extent to which you agree with each of the following statements relating to your organization’s strategy, by circling the appropriate number.*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our strategy is based upon the quality, rather than the price, of our products</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We typically compete by introducing new products ahead of others, rather than by improving existing products.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our strategy is based upon the production and promotion of a wide range of products</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We compete by expanding into new markets, rather than by focusing upon existing ones</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We always try to respond rapidly to new ideas from the environment</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We always seek to adopt the latest forms of technology, at the earliest opportunity.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

#### Section B: Organizational Structure

**B1: Configuration of Structure**

*Please indicate the extent to which you agree with each of the following statements.*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our organization has a very strong hierarchical structure, with many layers between the most senior and most junior employees.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Each manager has a very large number of subordinates reporting directly to them.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The structure of our organization is very flat.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We try to minimize the number of subordinates reporting to any one manager.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

**B2: Centralization**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>There can be little action taken in our organization until a supervisor approves the decision.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Any employee wanting to make their own decisions would be quickly discouraged.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Even relatively minor issues have to be referred to someone higher up for a final decision.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our employees generally feel empowered to take responsibility for making their own decisions.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

**B3: Standardization & Formalization**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a written rule does not cover some situation, then we make up informal rules for doing things as we go along.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>There are many operational aspects of our business that are not directly covered by some formal rule or procedure.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our company has a strong culture of doing everything by the book.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Rules and procedures are typically presented in a very formal and documented manner.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>
Appendix I

**B4: Horizontal Relationships**

*Please indicate the extent to which you agree with the statements below.*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our staff are comfortable to directly communicate with colleagues from different functional areas.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>There are very strong boundaries between each functional area.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>People from different departments typically share very similar objectives.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>When people from different functional areas get together, the atmosphere is typically very tense.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The maintenance of informal communication channels between departments is a high priority within our organization.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

**Section C: Flexibility**

*C1 The flexibility of your organization*

*Please indicate the extent to which you agree with the statements below.*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>We can quickly adjust the capacity / volume of our production processes, when needed.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our company can, if necessary, introduce a wide variety of product features.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>We typically find it difficult to adjust our product mix, to suit the changing requirements of the market.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our organization often experiences difficulties when adjusting its standard production processes.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Where necessary, we can restructure our organization, in a relatively short period of time, without incurring too much extra cost.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

**Section D: ERP Adoption**

*D1 Current Usage*

Is your organization currently using an Enterprise Resource Planning [ERP] System, e.g. SAP, Baan, Peoplesoft etc?

Yes ☐ No ☐

*If no, please return your questionnaire in the envelope supplied.*

*If yes, please answer the questions in the remaining sections of the questionnaire.*

How long has your organization been actively using an ERP system? ______ years
### Appendix I

**D2 The Scale of your ERP implementation**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our ERP implementation comprises a small number of functional modules, rather than a complete enterprise-wide system.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Most of our computers / work stations are connected to the ERP system.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Access to information from the ERP system is strictly restricted to a limited numbers of users with appropriate authorization.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>A large proportion of our staff use the ERP system on a daily basis.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The ERP system supports the vast majority of our organization's functional areas.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Our ERP system has been significantly customized to meet organizational requirements.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

**D3 ERP Benefits**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The adoption of ERP has greatly improved the quality of communication within our organization.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Supported the development of business innovations.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has significantly improved the quality and availability of information for decision making.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has enhanced our ability to develop business alliances and external linkages.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>ERP utilization has facilitated significant cost reductions within our business.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The use of ERP has improved our ability to monitor the performance of staff and business processes.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has greatly decreased the costs of our Information Technology.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>ERP adoption has improved the integration of our business/ processes</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has delivered improved enterprise-wide decision support facilities.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>ERP utilization has increased our ability to respond to customers effectively.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has provided us with a more versatile means of communication.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has improved the productivity / efficiency of our business processes.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>ERP utilization has reduced bottlenecks and facilitated cycle-time reductions.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has allowed us to more effectively differentiate our products and services.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>The adoption of ERP has significantly increased our IT infrastructure capability.</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>
尊敬的公司领导：

关于：公司组织结构的设计——由实践得到的经验

如您所知，在过去的几年中，公司高层领导及研究人员越来越关心公司的组织结构。其中，公司战略与信息系统对组织结构的影响首当其冲的受到了共同关注。

我和我的同事正在着手研究一项新的课题，以期望探寻今天中国的商业公司是如何设计他们的公司结构。我们坚信可以像您一样的职业经理人身上获得单纯及理论研究所无法获得的经验教训。如果您能够抽出 10 分钟的时间帮助我们填写问卷，我们将不胜感激。在此我以一个长期从事学术研究学者的名义担保，所有问卷都将严格保密，我们发送的任何问卷都是匿名形式返还的。任何组织或者个人的信息都不会出现在我们的报告或者发表的论文中。

如果您需要，我们会将本次问卷调查的结果通过邮寄，电邮或传真发送给您。如果对本次调查有任何疑问，意见或建议请直接联系我的中国助理：王媛。联系方式：通讯地址：山东省东营市黄河路 130 号鸿基大厦 B 座四楼 555 室；邮政编码：257094；电话：0546-7361555；电邮：llxin999@126.com。或者，您可以通过上方的地址直接与我联系。

感谢您对我们工作的支持，真诚期待您的回音。

此致

敬礼

Dr. Neil Doherty
信息系统研究组
组织结构的设计：中国企业实践经验的研究

再次感谢您对我们问卷调查的参与和对我们工作的支持。

所有本次问卷调查的信息将采取匿名的方式。您所有的观点及见解
都是用来进行量化的数据分析。

请您将填写好的问卷封于我们提供的免邮费信封中。

如果需要我们给您发送一份本次问卷调查的报告结果，请填写您的联系方式。
姓名：
地址：
电邮：

企业的基本信息

Q1 贵公司所在的行业
□ 食品，烟草，饮品。 □ 纺织，印染，皮革，箱包
□ 电子及电气产品 □ 纸浆，印刷以及相关行业
□ 化工及相关产品 □ 机械，装备。
□ 木材及木材加工 □ 其他（请在以下注明）：

Q2 贵公司的企业性质
□ 外资，或者合资企业 □ 民营企业 □ 国营企业

Q3 贵公司的员工数，约______
### 第一部分: 组织结构

<table>
<thead>
<tr>
<th>A1: 框架</th>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>请勾画右栏的数字，以显示下列声明与贵公司实际情况的符合程度</td>
<td></td>
<td></td>
</tr>
<tr>
<td>我们公司有严格的等级制度，在最高层管理人员与最低层员工之间有很多的管理层</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>公司的每一位经理下辖众多由其直接领导的员工</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>我们公司的结构十分扁平，即公司等级数量较少</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>我们努力尝试减少每一级经理或管理人员所管理的下属员工人数</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A2: 集权</th>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>未经上级主管批准，员工不得擅自主张</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>我们不鼓励员工自作主张</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>细微的事情也必须由上级主管做最终决定</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>公司允许决大多数员工做出自己的决定</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A3: 标准化</th>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>如果有些情形没有直接可以借鉴的规定，公司会制定非正式规则</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>公司中的许多事情其实并没有正式的书面规定</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>我们公司有很强的按照公司的规章制度办事的企业文化</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>规章、制度、工作程序通常都是以书面形式保存和呈现给员工的</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A4: 部门间关系</th>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>不同部门之间的员工可以自由直接沟通</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>不同部门之间有着严格的界限</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>不同部门的员工有共同目标</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>不同部门员工在一起的时候，气氛时常变得比较紧张</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>公司领导很重视维护不同部门之间的非正式沟通渠道</td>
<td>7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>
### 第二部分：公司价值取向

请勾画右拦的数字，以显示下列声明与贵公司实际情况的符合程度

<table>
<thead>
<tr>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

公司更加注重产品的质量而不是产品的价格

对公司而言，不断地开发新产品并将其早于我们的对手推向市场比不断改进已有的产品更为重要

我们的策略基于一系列产品的生产与促销

与对手的竞争中，不断开发新市场比专注于已有的产品市场更为重要

我们尽最大的努力去迅速对一些新事物做出反应

我们致力于采用最新科技与生产装备

### 第三部分：生产

请勾画右拦的数字，以显示下列声明与贵公司实际情况的符合程度

<table>
<thead>
<tr>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

如有必要，我们可以迅速地调整生产部门的产量与生产能力

如有必要，我们可以向顾客提供很多具有不同特性的产品

我们经常发现很难调整推向市场的不同产品组合，来适应不断变化的市场需求

调整生产流程对公司来讲比较困难

如有必要，我们能够在较短时间内，不花费太多资源的前提下，重新设计和改变公司的结构

### 第四部分：企业资源计划（ERP）

**D1 目前状况**

您公司目前是否已经安装了企业资源计划？

- [ ] 是的
- [ ] 没有

如果没有安装，请将问卷放入提供的信封中并将其寄回

如果已经安装，请继续回答以下的问题

贵公司已经使用企业资源计划多长时间了

237
### D2 企业资源计划的规模

<table>
<thead>
<tr>
<th>请勾画右栏的数字，以显示下列声明与贵公司实际情况的符合程度</th>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>我们仅仅安装了企业资源计划（ERP）的部分功能/模块，而不是覆盖整个公司的系统</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>公司绝大多数的微机或工作终端与企业资源计划（ERP）连接在一起</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>在使用企业资源计划（ERP）的时候，只有那些有授权的人才可以使用存储的数据</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>公司的很多员工每天都要接触，使用企业资源计划（ERP）</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>我们的企业资源计划（ERP）能满足公司大多数部门/功能业务需求</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>销售商按照我们的需求对企业资源计划进行了非常大的改动，这些也大大增加了我们购买该系统的开支</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

### D3 企业资源计划效益

**企业资源计划的安装……**

<table>
<thead>
<tr>
<th>符合</th>
<th>不符合</th>
</tr>
</thead>
<tbody>
<tr>
<td>大大提高了公司内部信息交流的质量</td>
<td>7</td>
</tr>
<tr>
<td>对公司的创新有很大的助益</td>
<td>7</td>
</tr>
<tr>
<td>使我们能够更加准确，及时的获取决策所需要的信息</td>
<td>7</td>
</tr>
<tr>
<td>增强了我们发展商业联盟及外部关系的能力</td>
<td>7</td>
</tr>
<tr>
<td>大大降低了公司运营成本</td>
<td>7</td>
</tr>
<tr>
<td>使我们能更好的监督员工的工作和企业运转</td>
<td>7</td>
</tr>
<tr>
<td>大大减少了公司信息科技的维护与使用成本</td>
<td>7</td>
</tr>
<tr>
<td>极大的整合了公司部门以及不同的流程</td>
<td>7</td>
</tr>
<tr>
<td>提高了公司范围内决策支持力度</td>
<td>7</td>
</tr>
<tr>
<td>使我们能够更有效的满足不同客户的需求</td>
<td>7</td>
</tr>
<tr>
<td>提供给我们更加多样化的沟通手段</td>
<td>7</td>
</tr>
<tr>
<td>提高了公司的运营效率</td>
<td>7</td>
</tr>
<tr>
<td>减少了生产中的瓶颈，缩短了生产周期</td>
<td>7</td>
</tr>
<tr>
<td>使我们产品与服务更好的区别于对手的产品与服务</td>
<td>7</td>
</tr>
<tr>
<td>极大的提升了本公司信息设备的使用效能</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix III

English Version of Interview Script-Revision 1

Organizational demographics

1. Approximately, how many staff does your company employee?

2. What are your main products and what industry sector you are engaging in?

Others

1. What were your main motivations / the key drivers for your organization to adopt ERP?

2. Could you tell us what are the main benefits after you adopting ERP? If the realized benefits are significantly different to the original drivers, can you please explain why this difference has arisen?

3. How do you generally evaluate your ERP systems' impact, benefits and functions?

4. Do you think which one best represent your company's strategy? (Prospector, analyzer, defender)? You will need to have a clear idea of how you will help interviewees to objectively determine the nature of their strategy, in terms of: prospector, analyzer or defender.

5. In your opinion, what is the relationship among the three elements of organization, strategy, structure and Information system (esp. ERP)? Is that true that your organizational structural arrangement and ERP investment, ERP arrangement, are all greatly influenced by your strategy?

6. Generally speaking, how widely is the ERP system spread within your organizations? Is that true that lots of staff could use the ERP system, on a day to day? Does the ERP system cover all the main functional departments within your organization – if not, which departments are not covered?

---

8 Strategy Typology Descriptions from Snow and Hrebiniak (1980)
7. Do you think that your strategy greatly decide your ERP decision such as scale, cost, vendor and etc?

8. Following the adoption of ERP, do you think that the number of vertical levels in your organization's hierarchy has changed? If yes, has the number of levels increased or decreased? Can you please provide some specific examples of how the ERP package has changed the number of levels? Was this a planned or an incidental impact of the system's implementation? Has this impact improved the organization's performance, and - if so - how?

9. Following the adoption of ERP, could you tell me whether the number of decisions made by staff in the lower levels of your organization's hierarchy has changed? If yes, has the number of decisions increased or decreased? Can you please provide some specific examples of how the ERP package has affected the level of employee empowerment? Was this a planned or an incidental impact of the system's implementation? Has this impact improved the organization’s performance, and - if so – how?

10. Following the adoption of ERP, has the number of written procedures and rules guiding activities of staff changed? If yes, has the number of levels increased or decreased? Can you please provide some specific examples of how the ERP package has changed the number of procedures? Was this a planned or an incidental impact of the system's implementation? Has this impact improved the organization's performance, and - if so – how?

11. Following the adoption of ERP, is there any change of the number of your functional departments? Can you please provide some specific examples of how the ERP package has changed the number of functional departments? Was this a planned or an incidental impact of the system's implementation? Has this impact improved the organization’s performance, and - if so – how?

12. Following the adoption of ERP, has the level of horizontal coordination, within your organization, changed? If yes, has the level increased or decreased? Can you please provide some specific examples of how the ERP package has changed the number of functional departments? Was this a planned or an incidental impact of the system’s implementation? Has this impact improved the organization’s performance, and - if so – how?
13. Which has a more influential impact on your organization's structural configuration: strategy or ERP? Can you please justify and explain your answer.

14. Do you think ERP give your organization greater flexibility? Can you please provide some specific examples of how the ERP package has changed your organization's flexibility? Was this a planned or an incidental impact of the system's implementation? Has this impact improved the organization's performance, and – if so – how?

15. Is that true that your organizational structure is greatly changed for the purpose to install ERP? Do you think these change offer you great flexibility? If yes, do you think that it is technical superiority of ERP or resulted structural change that is the true reason underpin this flexibility?
Appendix IV

Chinese Version of Interview Script-Revision 1

1. 能告诉我们您公司大约雇佣了多少员工？
2. 请问您公司的主要产品是什么，您公司所在的产业？
3. 究竟是什么原因促使您们最终选择了安装 ERP？您们安装 ERP 主要目的是什么？
4. 您认为安装 ERP 带给贵公司的最大的收益是什么？如果这些已经实现的收益与您公司安装 ERP 的动机相左的话，能否告诉我们造成这些差异的原因？
5. 请您简括性的评介一下您的 ERP 系统对您公司的影响，带来的收益，以及它的主要的功能
6. 请问哪一个更好的代表了您公司策略？
7. 能否告诉我们您所认为的公司结构，策略，以及 ERP 之间的关系。您是否认为您公司的 ERP 的投资，公司结构的安排，在很大程度上是由策略决定的。
8. 能否告诉我们您公司的 ERP 系统在贵公司分布有多么广泛。是否大多数的员工可以每天接触到使用 ERP 系统？能否告诉我们您公司有多少的部门安装/使用 ERP 系统？如果有的部门没有安装 ERP 系统能否告诉我们是哪个部门？
9. 您是否认为实际上贵公司的策略决定了您公司的 ERP 项目的规模，成本，ERP 系统的厂商，以及其他方面的 ERP 决策
10. 安装 ERP 系统后，贵公司的上下级的级别层次数量是否有所改变？是增加了还是减少了。这些改变是计划的改变还是由于安装 ERP 后带来的不经意的改变。这些改变是否提高了公司的业绩。如果是，请你告诉我们这些业绩的改变是如何以结构改变联系在一起的。
11. 贵公司的书面的规则，规章，步骤是否在安装 ERP 有所增加或者减少。如果是，是使得这些规章，制度，步骤增加了或者减少了。你是否能告诉我们 ERP 的安装时具体如何改变这些的。能否提供给我们一些具体的实例。这些改变是否是贵公司提前计划的改变。这些改变是否提高贵公司的业绩。如果是，这些改变是如何实现的。
12. 贵公司的职能部门的数量是否在安装 ERP 后又所改变？能否提供给我们一些这方面的具体实例。这些改变是否是贵公司提前计划的改变。这些改变是否提高贵公司的业绩。如果是，这些改变是如何实现的。
13. 贵公司的各部门之间的沟通、合作是否在安装 ERP 后有所改变。如果是的话，能否提供给我们一些这方面的具体实例。这些改变是否是贵公司提前计划的改变。这些改变是否提高贵公司的业绩。如果是，这些改变是如何实现的。
14. 您认为是公司的策略还是 ERP 对您的公司有更大的影响？能否告诉我们为什么您这样认为。（给出一些具体的实例，原因）

15. ERP 系统是否增强了贵公司的灵活度。如果是的话，能否提供给我们一家这方面的具体实例。这些改变是否是贵公司提前计划的改变。这些改变是否提高贵公司的业绩。如果是，这些改变是如何实现的。

16. 贵公司的企业结构是否因为安装 ERP 系统而做出了很大的改变？这些结构上的变化本身是否使贵公司更加灵活。您认为，这种企业灵活程度的提高从根本上使由于 ERP 系统的强大的科技含量还是组织结构的改变而提供的。
1. What are your main business aims and objectives?

2. What approach to developing strategy does your company adopt? Ask this as a general question first.

3. Which of these models do you think your strategy most resembles (Prospector, Analyzer, Defender, and Reactor)?

4. Why did your company choose to implement ERP software? What were the specific aims and objectives of the project? Did these aims and objectives come directly from the business strategy? If yes, please provide specific examples of how it was perceived that ERP would support the strategy.

5. Describe the ERP implementation process, how was it managed?

6. Was there any significant customization effort for your ERP software? If so, when was this customization decided upon, during the planning stage, or after implementation had begun? To what extent has the customization of the software been lead by the strategy? Can you give any examples?

7. Are there any specialized processes in your company that are not supported by ERP? If so, can you give me an example?

8. How widely is ERP used within your organization? For example, does the software underpin most operations, or only some business functions such as finance? Is it used by the majority of employees?

9. Was your organization organized by 'function' before ERP was introduced? Has your organization become more 'process orientated' due to the ERP implementation? If so what sort of adjustments were made to the business processes due to the adoption of ERP? Were these adjustments only needed by the ERP system or did they also serve your strategy? If the latter, could you provide some examples please? Did these adjustments to processes constitute a full-blown business process re-engineering initiative?

11. Did you need to recruit new staff to support business processes as a result of ERP implementation? If so, how many and what is their role? Do you employ less staff now? If yes, how did you manage the staffing issues? (Did they make people redundant—if so how did this affect the workforce, or did they move staff to other roles, did they offer retraining etc.)? (If they did take on more staff and are government funded, so they made no redundancies ask if the introduction has affected their efficiency and effectiveness and how).

12. How would you describe the organizational configuration of your company, at present? (Ask for an organizational chart if possible—a hand drawn one is fine, make sure you understand all the levels in the hierarchy).

13. How has your organization’s strategy helped to shape this organizational configuration? Could you please give some examples?

14. Did the introduction of ERP result in changes to the company’s organizational configuration? If so, in what ways? (Make sure you get examples). How was this change managed? Was the experience a positive one for staff?

15. If changes were made, was this adjustment needed to facilitate the operation of the new ERP system or was this adjustment needed to serve your strategy? If the latter, could you please tell me whether ERP supported the configuration adjustment? Could you give an example please?

16. If ERP has not modified the organizational configuration, can you please suggest why this might have been the case.

17. Do you think that your present organizational configuration contributes to the level of flexibility of your organization? Some practical examples please. If yes, is this way of working supported by ERP, or not?

18. How would you describe the level of centralization in your organization, at present? To what extent has this level of centralization been brought about as the result of specific corporate strategies? Examples please.
Appendix V

19. How has the introduction of ERP helped to shape this level of centralization? For example, has its introduction resulted in any changes to the lines of authority in the organization? If yes, do you think that the new pattern of authority supports your strategy better? Why and examples please?

20. Has the introduction of ERP increased / decreased the extent to which employees can make decisions, in their daily activity at an operational level? If yes, can you please provide specific examples of how ERP has modified the level of employee empowerment?

21. If ERP has not modified the level of centralization, can you please suggest why this might have been the case.

22. To what extent does the level of centralization affect organizational flexibility? Please provide examples.

23. How would you describe the inter-departmental relationships that your company is currently experiencing? For example, are there high or low levels of co-operation and communication between functions? Has the implementation of ERP helped shape this current level co-operation / communication? How did ERP implementation help you to manage these changes? Why? Examples?

24. Do you think that the current interdepartmental relationships support the current strategy? Why? Examples?

25. Do you think that the interdepartmental relationships contribute to the present degree of flexibility of your organization? Some practical examples please. If yes, is this contribution from configuration supported by the operational practices implemented due to ERP? Do you think that ERP has been beneficial in developing interdepartmental relationships?

26. Have the organization’s working practices changed to accommodate the ERP software? If so in what ways have they changed? (Examples). Are working practices more or less standardized than before the ERP implementation?

27. Do you think this kind of standardized/non-standardized structure is better? Why? Could you please tell me how this kind of arrangement could be used to serve your strategy? Could you please give some examples?
28. Do you think that the present level of standardization influences the degree of flexibility of your organization in any way? Does ERP support flexibility in any way? Some practical examples please.

29. If ERP has not modified the degree of standardization, can you please suggest why this might have been the case.

30. Do you think that the operational practices introduced because of the ERP software have contributed to organizational flexibility? Examples? Or do you think that the flexibility is delivered by organizational structural change?

31. Do you think that the implementation of ERP has been a success? Please provide some specific examples of the benefits that have been achieved. If the project has not been a success, then why not?

32. What would you do differently if you were to do the project again?

33. Do you think people find their roles have more or less responsibility than before ERP was introduced? Why?

34. Has the ERP system provided managers with relevant information to help them decide on strategy?

35. Has the project fulfilled all the aims and objectives?
Chinese Version of Interview Script-Revision 2

1. 请问贵公司的主要的企业目标是什么？
2. 贵公司采用何种方式来发展自己的策略的？
3. 请再下列描述中选择一个最适合贵公司的描述。
4. 为什么贵公司选择安装 ERP 系统？能否告诉我们这个 ERP 项目是否有某种特定的目
   的 / 目标？ ERP 服务的目的 / 目标是否最终服务贵公司的公司的策略的，或者说是
   否这些所服务的目的 / 目标是直接根据贵公司的公司的策略或者目标引申来的？ 如
   果是的话，请给出些具体的例子说明您所认知的 ERP 项目对企业的策略的支持。
5. 请描述一下具体的 ERP 实施的过程，你们如果对这个项目进行的相关的管理？
6. 贵公司安装的 ERP 软件是否根据贵公司的需要做出了很大的改动，而不是原来的比较
   标准的商业软件？这些相关的软件变动的决定是否是在 ERP 的实施策划阶段做出的，
   还是在具体的实施阶段做出的？ 您认为在多大的程度上这些变动是由贵公司的策略
   来决定的？请给出相关的例子？
7. 贵公司是否有些特殊的 ERP 没有覆盖/不能支持的流程？如果有的话请给出具体的例
   子
8. 贵公司的 ERP 应用 / 覆盖的面是否十分广泛？ 这里所值得覆盖面指的是否 ERP 支
   持 / 覆盖大部分的操作 / 流程？是否贵公司的 ERP 仅仅支持某些功能部门比如说会
   计， 是否贵公司大部分员工每天使用接触 ERP。
9. 在安装 ERP 以前贵公司的组织结构是否是按照功能部门来组织的？是否因为 ERP 的
   安装贵公司的结构更多的趋向于流程主导？ 如果是的话，请告知由于 ERP 的安装商
   业流程做出何种调整改动？ 是否这种所谓的改动仅仅是为了适用 ERP 的安装？抑
   或是为了服务于公司的总的策略？如果是后者的话，是否能给予相关的例子？这些所
   做出的调整是否是服务于公司的全方位的 BPR 的改进？
10. ERP 的安装是否给予贵公司灵活性有所帮助？生产的灵活性？例子？组织结构的灵
    活性？例子？
11. 再 ERP 安装后贵公司是否进行了相关的员工的招募用于服务 / 支持公司的流程？如
    果是的话，能否告知相关招聘了大约多少人员，他们是什么样的公司人员，他们的工
    作职能？但总的来说，贵公司的员工人数是否有所减少？如果是的话，请告知贵公司
    如何安排得员工的？（是否是一些员工显得多余 - 如果是这些如果影响贵公司的员
    工总数？ 是否这些多余的员工转移的其他的岗位，贵公司是否给予这些员工重新再
    培训？）( 如果公司确实人员总数有所增加，而且政府进行补贴，那未清告知 ERP 是
    怎么影响公司的办事效率与效能？

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12. 请给出目前贵公司的总体结构（扁平/多级别）？请描述一幅大体的贵公司的组织机构图表？

13. 请告知贵公司的策略如何影响/定形现在的组织框架？能否给出具体的例子？

14. ERP 的安装是否改变了贵公司的总体的框架？如果是的话，如何给出的改变，例子（必须要）？如何管理/进行的相关调整？是否大部分员工对这些变动持积极的态度？

15. 如果做出了变动，请告知这些变动是仅仅出去考虑安装 ERP, 使企业结构更加符合 ERP 考虑的，还是这种变动根本性的是为了服务贵公司的企业的策略？如果是后者请告诉我们贵公司的 ERP 是如何帮助贵公司的结构上改变从而服务于公司的策略。请举例说明。

16. 如果 ERP 没有导致组织的框架发生改变，您能告诉我们这个事为什么吗？

17. 您是否认为现在的组织结构的框架是否有利于/帮助贵公司实现公司的灵活性？请给出具体的例子。如果是，这里面是否 ERP 起到一定的帮助作用。

18. 请给出您感觉贵公司的目前的策的权化？您感觉这种集权程度在在大程度上是由贵公司的策略决定的。请给出具体的例子。

19. 您觉得 ERP 的安装如果影响/决定/定形现在的企业的集权的程度。打个比方说，ERP 的引进是否导致了直线职权/等级链的改变？如果是，您是否认为这种职权的改变使得组织能够更好的服务于贵公司的策略？您为什么这么认为，能否给出具体的例子？

20. ERP 的引进是否增加/减少了企业员工的决策/决断的权力的大小，如果是，请您给出具体的例子告知 ERP 的引进如何改变了企业员工的授权的大小？

21. 如果 ERP 的引进没有更改集权的程度，您能否告知这是为什么？

22. 您认为多大程度上企业的集权程度影响了企业的灵活性？请给予例子？

23. 您是如何看待贵公司现在的部门间的关系？比方说他们之间的合作与沟通是否顺畅，合作沟通的程度是比较高/低？ERP 的引进是否在多大程度上影响了现在的横向部门间的关系？是否 ERP 的实施帮助定形目前的部门间的横向关系？ERP 的实施是如何帮助你们实现这些改变的？为什么？例子？

24. 是否认为目前的横向部门间的关系是否支持现在的策略？为什么？例子？

25. 您是否认为目前的横向部门间的关系对目前企业的灵活性造成影响？如果，您是否认为这种灵活度是由于安装 ERP 带来的企业的操作的改变而造成的？您是否认为 ERP 是否对实现在目前的企业横向部门关系有帮助？

26. 您是否认为公司的工作的惯例根据 ERP 做出修改？如果是请告知如何做出的修改？例子？是否目前工作/操作比以前没有 ERP 以前更加标准化了？
27. 您是否认为目前的这种标准化状态是否更好一点？为什么？请告知这种安排是更何更好的服务于公司的策略？能否给出具体的例子？
28. 您是否认为目前标准化的状态是否对企业的灵活性造成影响？ERP 是否支持企业的灵活度？请给出一些具体的事例。
29. 如果 ERP 没有改变企业的标准化程度，请告知为什么？
30. 您是否认为企业的一些由于 ERP 的引进造成的工作方式/惯例的改变影响/改变/贡献于企业的灵活性？例子？您是否认为企业的灵活性的改变是由于企业结构的改变实现的？
31. 您怎么看待贵公司的 ERP 项目？成功？请给出具体的例子告知 ERP 的引进给贵公司带来的改进/益处？如果项目没有成功，告知为什么？
32. 如果重新开始这个项目您将做那些不同的改动？
33. 您是否觉得公司员工的职责是否再 ERP 引进后发生改变？更多/更少？为什么？
34. ERP 系统是否给公司管理人员提供了更多更加有力的相关信息用于决策？是否帮助他们决定企业的策略?
35. ERP 项目是否实现公司引进 ERP 以前所有的目的/目标？
## T Test for Two Strategy Typologies of Structural Variables

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

Summarized Data of All Interviews

Interview 1

Date of Interview: 2006 September
Location: Beijing

Interviewee 1 Name: Mr. GuoTao Yang
Position in Company: Vice President

Interviewee 2 Name: Mr. XiangWen Lai
Position in Company: IT Manager

Comments:
This is the interview with two staff of a motor manufacturer. One is the vice president of the company and also the person who answered most of the questions. Another one is from their IT department, the IT manager. I have requested to interview them individually but they said their viewpoints would be similar so it would be unnecessary to interview them separately. They arranged the interview in the Friday afternoon and Manager Lai left about 30 minutes before all done.

Company Background:
The company is one of the biggest motor manufacturers in China and 35% of their shares are controlled by the State. There are 24,000 employees in this company.

Summary of Interview
The company is the top one of Chinese Commercial Motor Manufacturer and it adopted two ERP systems; its sales module from SAP and other modules from Yongyou. The reason that company wanted to adopt ERP is to support their fast expansion and to integrate different functions together. There is large coverage of ERP in this company. ERP is, advised by the interviewee, helping them reduce the production cycle and the number of headcounts (they fired some staffs). No change of configuration of organization; some decentralization of middle level manager’s decision rights; like most other companies, they standardized their working practices and their interdepartmental integration got better than before. ERP helps them develop their flexibility.
Appendix VIII

Interview 2

Date of Interview: 2005 July
Location: Beijing

Interviewee Name: Mr. Tong Wang
Position in Company: Marketing Director

Comments:
Interview is contacted by my friend, who has some personal relationship with their marketing director. When carrying out this interview, I met some difficulties because the GM of the company asked them to be careful about the topics I would ask. One IT staff accompanied marketing director for technical topics.

Company Background:
The company is an elevator manufacturer and it is one subsidiary of a holding company. Their shares are publicly listed. This company is located in Chinese Silicon Valley.

Summary of Interview
The company adopts a prospector strategy and the reason they decided to adopt ERP is to support their growth and also to provide timely information. For a long time, their management had the trouble in information management. This company adopted an ERP system from a domestic vendor, Kingdee, who enjoy large share in China. ERP covers large part of their functions and processes. They changed ERP rather than change their own structure, because, as they said, they must balance between cost, compatibility and strategy. They thought that their ERP project is successful because it provides them timely information and thus could respond to customer timely. They didn't change their span of control and the number of hierarchy level, while their standardized their working practices. But their interdepartmental relationship did get better coordinated. The reason that they didn't change their configuration is because ERP is just a kind of management tool dedicated to providing information, in their opinion.
Appendix VIII

Interview 3

Date of Interview: 2006 July
Location: Beijing

Interviewee Name: Mr. Yuejin Yin
Position in Company: Executive Director

Interviewee Name: Mr. Hongsheng Liu
Position in Company: Chairman

Comments:
This is the interview with two staffs from a company focusing in the biochemical sector. The interviewees include the chairman of the board and the CEO of the company. The interview was conducted in the CEO's office with these two interviewees. The CEO answered most of my questions, while the chairman listening to our talking.

Company Background:
The company is the member of Beijing High-Tech Park and they mainly engage in production of Biochemical. Their board directors held all shares of the company and they jointly participate in the management of this company. That is, it is a private owned company.

Summary of Interview
The company adopts emergent strategy planning method and their strategy is much similar to analyzer. Their ERP system is not the standard off-the-shelf product and was designed by a small local software company. The reason not to adopt standard one is due to the consideration of cost and the capability of their staff for using this software. The ERP system was dedicated to their present practices. The reason to adopt ERP was to integrate business and provide common platform for whole company. No change of general configuration and centralization. They got more standardized and more process oriented. Presently, the only benefits, they think, are the better information provision of the system. Finally interviewee suggested that ERP didn't improve their flexibility. And their ERP project is not a successful one.
Appendix VIII

Interview 4

Date of Interview: 2006 June
Location: JiNan

Interviewee Name: Mr. ShaoShui Guo
Position in Company: Technical Support Manager

Comments:
This interview was conducted with the manager responsible for IT and technical support of a subsidiary of China Petroleum and Chemical Corp (SINOPEC). Long time ago before the questionnaire was completed, I have done one interview with the GM of a company of Shengli Oil Field, the second large oil field in China. Since there are some similarities between these two companies, and because of the long distance to carry out a second interview in this company, only one interview with one staff was conducted.

I've conducted one interview in Henan, which is also the subsidiary of SINOPEC. It was found there are great differences between Henan Case and this case. The company of Henan was instead a privately owed chemical company and has been purchased recently by SINOPEC.

Company Background:
The company is a highly bureaucratic state owned company and its ERP project is indeed externally requested by their headquarters. One thing that must be mentioned is the initiative to reduce headcount of SOEs during 1990s; it is called in China "XiaGang", which is one movement of the State to improve SOEs' productivity.

Summary of Interview
SAP ERP was adopted for this case. No change of the degree of centralization and general configuration; it got more standardized and the horizontal communication got better. But the politics had not been reduced after the adoption of ERP, though the responsibility got clear. Their benefit is that they could focus on more detailed management information. ERP helped them to improve their flexibility.
Date of Interview: 2006 April
Location: BinZhou

Interviewee Name: Mr. Zigo Zhou
Position in Company: IT Manager

Comments:
The interview is carried out with the IS manager who has worked in the company for many years. This company focuses on the production of internal combustion pistons. Since the interview was arranged by my friend in Government and since the company didn't want to arrange one more person, I did not get the chance for a second interview.

Company Background:
The company is a state owned company and focuses only on one product, piston. The company dominates Chinese market but their export market is not good yet.

Summary of Interview
The company adopts a defender strategy and enjoys very good performance, although it is a state owned company. They used MRP II long time ago and felt very satisfactory with the system. The reason to adopt ERP is to integrate business and also do some business process re-engineering. The ERP vendor is Star Enterprise, a domestic vendor and the ERP system cover many different functions of the company. This company only change structure slightly and try to accommodate to each other. They thought their project is very successful except that their ERP lacks the the support for offsite staffs. They rearranged their logistics department after the adoption of ERP. No change of general configuration but got more decentralized. At the same time, this company got more standardized and its interdepartmental relationship got better. They thought their ERP project was very successful one due to the reason the company is highly dependent on the operation of ERP system.
Interview 6

Date of Interview: 2006 May
Location: ZhengZhou

Interviewee Name: Ms. X
Position in Company: Human Resources Manager

Comments:
Because the company was being purchased by Sinopec, the prearranged interview with their technical staff was cancelled. And since it is in the course of acquisition, the interviewee requested not to disclose their company names and her name as well due to the sensitivity of management information. The interviewed person is their HR director who has been working in this company for more than 8 years. The person was introduced to me by my friend. I conducted the interview during her Lunch time in Macdonald.

Company Background:
Company is previously a private owned company specializing in chemical production. But during the time I contact them for interview, it was purchased by a State Owned Company, who wants to install SAP ERP into their company to substitute former one. Company is the second largest company in their sector and is full of young graduate.

Summary of Interview
The reason that they wanted to adopt ERP is to automate their data management and to manage their logistics, information and sales better. They also wanted to support the fast expansion of this company. Their project is thought to be very successful one because their processes have been changed; the sales function was better managed, after the adoption of ERP. There is some redundant staff after ERP adoption but those staff were transferred to other departments. It is a highly centralized company and after the adoption of ERP, some decision rights were managed by the EPR system. Practices got more standardized and coordination got better. No influence on their flexibility because they think their flexibility is good before.
Appendix VIII

Interview 7

Date of Interview: 2005 August
Location: Beijing

Interviewee Name: Mr. Unknown
Position in Company: Financial Manager

Comments:
This interview was conducted with the financial director of the Suzhou Hotel controlled by Taiwanese. The interviewee is a Taiwanese and he is the husband of my Taiwanese friend. I tried to contact him later but no reply any more.

Company Background:
The company is a hotel located in Suzhou, near Shanghai. The top management team of this company was all Taiwanese for the reason that, as suggested by the interviewee, they can’t trust others.

Summary of Interview
Before the adoption of ERP, the company information system was managed pretty well. The ERP system that has been adopted in this company is from SAP. The motive to adopt ERP is to better manage their data and then to improve their management practices. ERP was adopted for the purpose of supporting strategy and of reducing the cost. He argued that because ERP is mainly used for gaining better control, they don’t change their structure at all, that is, no changes of centralization, configuration, and standardization. ERP linked their legacy system very well and thus their process was coordinated better. No great improvement of their flexibility but the operation efficiency.
Appendix VIII

Interview 8

Date of Interview: 2005 July
Location: Beijing

Interviewee Name: Mr. Lei Wang
Position in Company: ERP consultant

Comments:
This is the interview that has been conducted with an ERP consultant who was responsible for the adoption of ERP of one subsidiary of Guo Yao Group (SinoPharm). The company is located in An Hui Province. This is the interview that has been conducted before the distribution of questionnaire.

Company Background:
The company has more than seven hundred staffs and is the subsidiary of Chinese GuoYao Group, who is stated owned company and specializing in medicine distribution. This company has been purchased by GuoYao for short time and management of the acquiring company requested this company to adopt the ERP system for publicity reason.

Summary of Interview
They choose a domestic ERP vendor who has installed ERP in their headquarters and sister's companies. The reason to adopt ERP is for publicity, to minimize their cost and to better connected with headquarters. Their ERP project could be derivates of long term planning. Generally there is some changes of the configuration. Centralization is changed but difficult to articulate exactly because the functional rights are getting more centralized and other rights getting more decentralized. More standardized practices are adopted. Furthermore, the horizontal coordination is getting better due to the clearing of the responsibility of the staff. No change of flexibility because the interviewee said that the flexibility is due to the human factor.
Appendix VIII

Interview 9

Date of Interview: 2005 April
Location: DongYing

Interviewee Name: Mr. Li
Position in Company: IT Manager

Comments:
This interview has been conducted with the Manager in charge of information systems, who attended all the process for ERP adoption and who also took part in the decision making for ERP project. This company is listed on exchange with good performance. It owns great market share in the newspaper market in China.

I was introduced by my friend to the interviewee. At beginning, he did not agree to conduct the interview but I showed them the university website and convinced them that the information would be only used for research purpose. At beginning he did not allow me to record the interview; I have to spend long time to persuade him to let me record it. Thus some of the start part of the interview has not well recorded.

Company Background:
The company is one of leading Chinese Newspaper used paper manufacturer and is located in DongYing. The company is a state owned enterprise and major in paper industry. But they also have some other product groups.

Summary of Interview
Originally the company adopts ERP for logistics and warehouse management. It chosen the ERP system from the vendor of Langchao and has used it for three years. Not quite successful due to placing too much attention on the technical perspective. Their levels of hierarchy and centralization have been reduced because after the adoption of ERP, their top management found it is possible, by dint of ERP, to reduce the number of levels of hierarchy. And the top management delegated less important decision to the middle level managers. The practices got more standardized and the interdepartmental coordination is getting better.
Appendix VIII

Interview 10

Date of Interview: 2006 September
Location: BinZhou

Interviewee Name: Mr. Shouxiang Sheng
Position in Company: IS Director

Comments:
This is the interview with Vice President of the company, located in Binzhou. The Vice President is responsible for IT management. This company major in fabric industry and it is very famous in Binzhou for its tax contribution to the local. The company is in a highly competitive environment due to the low cost competition in this industry. My friend in local government helped me to gain access to this company.

Company Background:
The company is a textile company that enjoy leading role in China and indeed there are lots of textile companies in Binzhou. The company is a state owned company and focus only in the textile industry.

Summary of Interview
The reason for the company to adopt ERP is to solve the traditional Chinese management problems—Human factors. Secondly they need to survive and be stronger in the industry. The ERP is highly bespoke one. The company pushed their ERP system fiercely due to the strong resistances from their staff. They reduce the level of hierarchy which further benefits their management capability. There is reduced number of vice presidents. More decentralized and standardized organizational structure. Finally better coordination is enjoyed by them. They fired large number of staffs and also recruited new graduates. The project is very successful one but they want to adopt another ERP system due to the first one is not so powerful one and they thought they could adapt to the highly standardized one now.
Appendix VIII

Interview 11

Date of Interview: 2005 June
Location: DongYing

Interviewee Name: Mr. Zili Li
Position in Company: Vice Director

Comments:
The interviewee company is one that engages in the chemical material production. It is a subsidiary of a state-owned company. The interviewee is the vice-director of the subsidiary.

Company Background:
Company is a highly bureaucratic company with strict control from state because its product is strategic to the nation. The products are the industrial oils. The company experienced reduction of staffs “XiaGang” before.

Summary of Interview
Although the ERP project is required to do so, the company still enjoys some benefits from the ERP project. Due to the staff qualities, they can’t change the structure greatly. Mainly benefits are including: reduced bureaucracy, reduced politics, reduced bribery, reduced purchasing prices, reduced logistics and operation cost, increased management information. But there are no changes of the general configuration of the company. The information centre is formed for maintaining ERP system. At the meantime, their centralization is not changed but some functional decision rights such as purchasing. The company got more standardized and later relationship got better due to the clear responsibility. Finally, it was found no increase of flexibility because they don’t need to be so. They are still under planned economy philosophy.
Date of Interview: 2006 July
Location: ShangHai

Interviewee Name: Mr. Utz
Position in Company: Director of Purchasing

Comments:
This is the transcript from the interview with the Purchasing Director of a foreign owned enterprise. I am urging him to introduce me to their Beijing Headquarters in order to get interview opportunity with their IT staff. However, at last I didn't get further change.

Company Background:
The company is a foreign controlled company specializing in medical solutions. The company enjoy dominant role in Chinese medical market. Its major operation is located in Shanghai.

Summary of Interview
The company adopted the same ERP system as their headquarters, SAP. They need to be leader in the market and thus invest lots in their business. Furthermore, they also need ERP help them to get smoothest operation in China and connection with their headquarters. ERP cover wide area and is highly customized. They recruited some staffs and transfer staffs from here to there due to the ERP project. It was told that ERP is dictated by their strategy and market and so does the structure. No change of configuration due to the earlier downsizing and BRP. Functions got more centralized but others got decentralized. The company got more standardized and this standardization make inflexible in local but flexible for the whole company. No improvement of interdepartmental coordination and communication because firstly they think that is the factor of culture and secondly they do very well in this respect before.
Appendix VIII

Interview 13

Date of Interview: 2005 April
Location: DongYing

Interviewee Name: Mr. Qintian Wang
Position in Company: Director of Financing

Comments:
This interview has been conducted with a company major in oil drilling and the interviewee is the vice director whose main area of responsibility is financial issues. The company is a stated owned company with listing in exchange. Lots of its policy however has been dominated the State. The interviewee also provided me one website where he told me that I can find some description of the project written by the ERP project team leader.

Company Background:
The company is a stated owned company and is highly bureaucratic. The company, like most of other state owned company ever experienced several movements such as XiaGang. The company is the second largest oil drilling company in China and plays an important role in Chinese economy. But it is highly bureaucratic company and most of the staff work like governmental official.

Summary of Interview
The company adopts ERP is partly due to their recently listing of their shares in foreign and domestic exchange. Also they want to manage their internal functions better. They didn’t think that their ERP system is very beneficial and they said that they need time to better understand the system. Furthermore, the interviewee held a very pessimistic viewpoint against ERP, because he thought that the adoption of ERP didn’t bring the benefits and changes as proclaimed. But it was found that, although the general configuration is left untouched, the functions got centralized and standardized and the interdepartmental communication got better. Staff will have to look more on process rather than function.
Appendix VIII

Interview 14

Date of Interview: 2006 August  
Location: DongE

Interviewee Name: Mr. HuaJin Liu  
Position in Company: IT Manager

Comments:  
The interview is conducted recently with the company’s senior manager responsible for the management of the Information system. I requested several times to conduct another interview with their staff from other departments but refused. Since the company is introduced by friend, who is the tax supervisor of the city. I asked him the possibility to get the second interview opportunity. But it turned out that I couldn’t get more chances.

Company Background:  
The company is originally a state owned company but being privatized recently. Now it has listed its shares in domestic exchange. It focuses on the production of a kind of traditional Chinese medicine.

Summary of Interview  
There are several reasons for them to adopt ERP. Initially they don’t plan to adopt ERP but want to use some software to link the company with its offsite sales department. But due to litigation with Software Company, they decided to adopt ERP to improve their information, order management and competences. The company focused more on the result rather than processes. After the ERP adoption, the company got more standardized and decentralized. The reason for this decentralization is because of clarity of middle level manager’s rights. They enjoy better interdepartmental coordination and communication and got more process oriented. They thought that the ERP project is a kind of staff that makes them more inflexible.
Appendix VIII

Interview 15

Date of Interview: 2006 July
Location: ShangHai

Interviewee Name: Mr. Ming Si
Position in Company: Purchasing Manager

Company Background:
This is the interview with purchasing manager of a foreign owned enterprise in China. Its holding company is US based. This company focused on providing OEM services to the major electronic and electric customers.

Summary of Interview
The company adopted SAP ERP and the reason to adopt ERP is to strengthen their manufacturing practices. Their main competence lies in manufacturing services. Therefore, they must do it better. At the same time, he emphasized that the profit could be gained much easier through the reduction cost rather than the increase of sales. Generally, there are no changes of organizational centralization and configuration. Main changes, like other companies lie in the change of degree of standardization. Here he said is slightly different. He thought that ERP work more effectively than written rules and regulations because you must do it according to procedures. This greatly improves the levels of standardization. The clarities of responsibilities resulting from the ERP project greatly help them for interdepartmental coordination and communication.
Date of Interview: 2006 May
Location: Beijing

Interviewee Name: Ms. Xuehan Wang
Position in Company: Assistant Manager

Comments:
This is the interview with the Assistant manager to the GM and the dean of the administration, the latter being responsible the headquarters administration and public relationship. The interview was contacted by local government official responsible for high-tech companies. This is the second interview of this company indeed. Another interview was conducted with their IT manager responsible for the ERP running in the company. Only after second request to the secretary, I can get this opportunity and then returned to Beijing for this case interview. Thus, this interview didn’t ask much about the background of this company.

Company Background:
The company is private company that focusing on the provision of telecom facilities and the related installation services. There are no many staff in this company. Instead, it focuses in the niche market rather than competes directly with other big companies in this industry.

Summary of Interview
The company experienced problems with their ERP production module. They said the reason for them to adopt ERP is because they need to manage logistics well, to informationalize company and also better manage their marketing departments. While they benefited from the ERP adoption, their production module is not successful because they experienced lots of change after the adoption of ERP. No change of general configuration because they tried lean structure before the adoption of ERP. No change of centralization and no great change of their staff numbers. The working practices got more standardized. Their interdepartmental coordination has been greatly improved.
Appendix VIII

Interview 16a

Date of Interview: 2006 April
Location: Beijing

Interviewee Name: Ms. JingJing Li
Position in Company: IT Manager

Comments:
This is the interview conducted with their IT manager responsible for ERP project. The interviewee has been working for this company for long time. Due to her another scheduled meeting, the interview time was not as long as expected. So I put lots of attention on time control.

Company Background:
The company is private company that focusing in provision of telecom facilities and related installation services. There is no many staff in this company and it focusing more in the niche market rather than competes directly with other big companies in this industry.

Summary of Interview
The reason to adopt ERP is to better manage their logistics practices and also to control cost. But to serve the management purpose is of first priority. This is a decentralized company that most of the decision rights are decentralized to the centre managers but this does not related with ERP adoption. Indeed there is no change of configuration and centralization. It got more standardized. And at the same time the interdepartmental coordination is getting better. More inflexible due to the limitation and rules and regulations placed by ERP. Furthermore they found that without ERP that they could be impossibly manage the fast expansion at all.
Interview 17

Date of Interview: 2006 July
Location: Hangzhou

Interviewee Name: Ms. Jin Kong
Position in Company: IT Manager

Comments:
This is the interview with Ms Jin Kong, the manager in charge of the IT department. This interview was done via telephone because during my staying in Hangzhou she was not available. And I can’t go to Hangzhou again due to the long distance. In view of the limitation of the time she can offer I cut some information of first part (company background), which has been detailed by Ms Lv, the first interviewee of this company. Also the sequence to ask the questions is different from the formal questions list because I need to ask the important questions. The main questions I asked her are related with the ERP systems.

Company Background:
The company is foreign controlled mobile phone company. It is located in Hangzhou and has experienced fast growth. Its headquarters is located in US.

Summary of Interview
The ERP project is not so successful at the very beginning and it is getting better and better after a several round of optimization. The ERP project was used to help them to control the company during high speed expansion and also to normalize some of these practices. There are not changes of configuration because she said that configuration is decided more by the management style. Company got more centralized due to the company want to be more centralized control of organization even before the adoption of ERP. Like most other company, it got more standardized and better communication.
Appendix VIII

Interview 17a

Date of Interview: 2006 July
Location: Hangzhou

Interviewee Name: Mr. Wei Liu
Position in Company: External ERP Consultant

Comments:

Company Background:
The company is foreign controlled mobile phone company. It is located in Hangzhou and experienced fast growth. Its headquarters is located in US.

Summary of Interview
He suggested that the reason that the company to adopt ERP from Oracle is to integrate with their global business and to strengthen their present practices. And as he said, the ERP consultant on few occasions will suggest customers to change organizational configuration and centralization. This is because firstly it is sensitive and secondly after a period using of ERP, top managers could realize the benefits that have been offered by ERP adoption and then probably arrange structure accordingly. He also emphasized the differences between Chinese vendors and Foreign vendors, the product of latter being more comprehensive, powerful and mature.
Appendix VIII

Interview 17b

Date of Interview: 2006 July
Location: Hangzhou

Interviewee Name: Ms. Jing Lv
Position in Company: Purchasing Manager

Company Background:

The company is foreign controlled mobile phone company. It is located in Hangzhou and experienced fast growth. Its headquarters is located in US.

Summary of Interview
The reason to adopt ERP is due to the requirement to support their fast growth and to integrate the company. There are lots of customization efforts in catering for their own practices. No change of configuration. Structure got more centralized after the adoption of ERP. More standardized and better interdepartmental coordination.
Appendix VIII

Interview 18

Date of Interview: 2006 August
Location: ShanDong

Interviewee Name:
Position in Company: IT Manager

Comments:
This company is originally a state owned company but privatized recently. It was via the help of my alumnus in WeiFang Municipal that I could gain access to this company. The interview has been carried out with the accompany of my alumnus. The interviews that day were conducted with their GM (the time is comparatively short) and with their IT managers. The interviews were carried out separately. Considering their GM may not give me too much time, I conducted the interview the IT manager first, by which I could get some initial information and then ask some specific questions that GM may disagree with IT manager.

Company Background:
It was a nationally controlled company during past and was in the brink of bankruptcy. After the privatization, its performance got better and better. But the problem with the company is the balance of power among the directors. Company experienced few competition.

Summary of Interview
The ERP in this company is not quite successful due to several reason. Firstly the company uses the separate modules very well but has problems to link them together. And company dare not to change structure or something related with balance of power greatly. Company is a highly decentralized before and the interdepartmental relationship is pretty good. But the adoption of ERP is rather a information provider here.
Interview 18a

Date of Interview: 2006 August  
Location: ShanDong

Interviewee Name: Mr. JingSheng Wu  
Position in Company: General Manager

Comments:  
This interview is conducted with the GM after I finished the interview with the IT manager. The interview time was a little bit short and therefore I chosen the questions, the answers to which from GM will be different form IT manager. The interviews with the two people are conducted in two offices and separately.

Company Background:  
The case is a steel tube company called Weifang Steel Tube company, which was contacted by my alumnus in WeiFang Municipal official. The interview is done accompanied by my alumnus and one of municipal office dean.

Summary of Interview  
The reason to adopt ERP is due to the need of sales system and to link it with whole organization. The reason that they don't change their structure lots after the adoption of ERP, he said, is due to that they focus more on the external market rather than the internal management of structure.
Appendix VIII

Interview 19

Date of Interview: 2007 July
Location: Beijing

Interviewee Name: Mr. ShuLin Sun
Position in Company: HR Manager

Comments:
The interviewee is sensitive to the confidentiality of this interview and requests me not to disclose the company name. The interview in this company has been conducted with two of staffs, interview with another staff being done just before I went back UK. This interviewee is the HR manager of the company.

Company Background:
The company is one that focuses in the provision of agricultural seeds to the farmers. It dominates some of sectors of this industry. Due to the recent listing in NADAQ the company is under high pressure from shareholders. The company has experienced quick expansion ever since its setup.

Summary of Interview
In fact this case is one of failure cases, although they don’t think so yet. The company adopts ERP due to listing and also the requirements of timely and exact information from lots of offsite sales centres. There are several reasons that directly induce the failure of the ERP adoption. First they lacked of top commitment. Secondly the cultural problems; thirdly there lack enough investigation and cooperation with external ERP consultant. Up to now there are no changes to centralization of functional rights; no significant benefits yet from the viewpoint of the HR manager. He suggested that the ERP system and the centralization of decision making of the top management make a tension in the organization, which makes the company very inflexible in response to market.
Appendix VIII

Interview 19a

Date of Interview: 2006 Oct.
Location: Beijing

Interviewee Name: Mr. Wang
Position in Company: IT Manager

Comments:
This is the interview with IT manager who is responsible for the installation of ERP system in the company. Since I have already interviewed the HR manager and asked him about the company's background information, I didn't repeat these questions again in this interview.

Company Background:
The company is one that focuses in the provision of agricultural seeds to the farmers. It dominates some of sectors of this industry. Due to the recent listing in NADAQ the company is under high pressure from shareholders. The company started not for long time and their management seems to be problematic.

Summary of Interview
First during this interview the interviewee told me their more than two years' project is temporarily hanged again due to lots of problems met at present. The reason of ERP project is to support its further expansion in order to build barrier to the incoming foreign companies in accordance with WTO agreements for this industry. Staff resists this system and lack of top management commitment. The company's configuration is changed but not for ERP adoption. And the change of accounting centralization is because of the publicity issue. More standardized but the staff refuse to adopt the new practices. No better horizontal communication yet.
Appendix VIII

Interview 20

Date of Interview: 2006 July
Location: Beijing

Interviewee Name: Ms. XiuPing Ji
Position in Company: Financing Manager

Comments:
The financing manager is arranged to interview with me by their vice president due to I request him to provide another opportunity. But the financing manager dislikes spending too long time for this interview and urging me to finish it as soon as possible.

Company Background:
The company is one that major in industrial electrical facility distribution in China while they have their own manufacturing site in China as well. It is private company that merged with a Chinese company

Summary of Interview
For them the reason to adopt ERP is rather to support their fast development of business. They manage the double or trebled sales without increase of human staffs by dint of ERP project. There is no change of configuration as they said that they are small company without too many departmental. At the same time, they argued that ERP is related more with position rather than with the general structure of organization. Communication is getting better by dint of ERP system. Timely and exact information could be traced through ERP system.
Date of Interview: 2006 July
Location: Beijing

Interviewee Name: Mr. Yuntian Wu
Position in Company: Vice Director responsible for strategy and IS

Comments:
This is the interview with a company that major in industrial electrical facility. There are two interviews conducted in this company. Although at beginning the VP promised my friend to give 1 hour interview time, when we arrived their company half an hour earlier, we were told he went to catch up flight. He arranged his VP (responsible for the strategy of the company) to answer my questions. Also after talking with VP, I requested to conduct one more interview with person who is very familiar with ERP. He asked their accounting manager to talk with me.

Company Background:
The company is one that major in industrial electrical facility distribution in China while they have their own manufacturing site in China as well. It is private company that merged with a Chinese company.

Summary of Interview
To automate most of the jobs and better manage their accounting and information related issues. They need to adopt better practices to control their fast growth of sales. The ERP is changed in accordance with their present practices. No change of general configuration as she said it is not related with ERP, which is a process and position related. Furthermore, she told that there are no changes of centralization. She said this due to the centralization is decided more by management style. Finally, it's found that the clarity of the responsibility helps them to better coordinate and cooperate among departments.
Appendix IX

English Version of Transcript of Interview I

Section 1: General Characteristics and Strategy

What are your business’s main objectives and aims?
Our main business objective is to sell medical equipment, to choose medical equipment and procure these equipments in China.

Do you have specific quantitative objectives, such as to double your turnover?
Our goal is to grow our business twice as much as the growth of the GDP of China, for example, if the GDP of China grows at 5%, we would grow by 10%; if it grows at 7%, we would grow at 14% or 15%.

How you develop your strategy, is it emergent one or is it planned?
We scan the market first, and then according to the conditions in the market, we design our strategy, because there are products we do not produce, we do not have to cover the whole market. We have set up our factory in Shanghai here and then we expanded to Shenzhen and Wuxi, and step by step we grow the number of offices in China. Our strategy is revised almost every year.

What’s your main objective for your marketing strategy, to find some niche or to offer a wide range of products?
We are a solution provider, usually we do not go to the niche market, and we offer wide range of products.

Is Product Development an important part of your strategy?
Sure, development is a very important factor, according to the products needs. We have high-tech products, but we also provide low technology products in some sectors. Here in China, we have good market coverage. But we can not sell high tech products to the west, first of all they do not need it, secondly, it is too expensive. Also the situation in rural areas is totally different, you can not adopt the same strategy, in the rural area, they need basic medical equipment, such areas do not want to buy high tech equipment and solutions.

What are your overall aims as far as the other competition is concerned?
This is not only in China, it’s worldwide, and we have to be the NO. 1, you have to be the leader of the market or at least No. 2, because No. 3 will have a problem making money.
Appendix IX

Can you have a look at this and choose one that best fit your company's strategy?
B [Prospector Strategy].

Section 2: ERP

Which ERP software do you use at the moment?
SAP

Why did you choose to implement ERP?
It is the company's policy that we have the ERP system across the whole of the world. Because first of all, we need a smooth process, as you know, we have factories here, and central management have to plan the production here, so they need the ERP system to run the production. The reason we choose SAP is because SAP is the preferred product by the headquarters.

SAP enjoy quite a big market share in China.
Yes, though the reason we chose SAP is because it is the one that has already been adopted by our headquarters and it is used by our worldwide subsidiaries.

Do you think your initiative to install ERP is appropriate for your strategy?
Yeah.

Can you give me some example?
It's matter of whether SAP ERP could support our strategy, the ERP system helps us, when we have our strategy and we say ok this is the market, this is what the market needs, then we can go down from the sales guys to work out the selling forecast, and then to build our manufacturing style; they came up with the forecast, they put the forecast into the ERP system, and forecast puts everything down, so our factories in China as well as all over the world knows there are certain amount of products we going to sell in China, this is what we have to take consideration when we do our planning. The system also helps us predict our needs worldwide, for example, it goes to Germany, it goes to China and it goes to the US, because we have factories across the world, we do not do all our manufacturing in China, at the same time we also do it in Germany or wherever.

Can you describe the implementation process?
We did it 10 years ago; first of all we have the situation that we have the whole ERP...
system in place in Germany. So we work with this system for a long time, but unfortunately this was an old system, and we have a lot of problems around it. You have data here and we download the data to the ERP system, unfortunately, the upload sometimes doesn't work, so we have to manually transfer the data into the ERP system. So there was no integrated solution, as we grow, we found that we could not sustain this approach in the future, so a couple of people sat together and said if there is anything available in the market that we can integrate all these system into one ERP system? So they compare couple of systems, then together with the consultant, they came up with the idea of using the SAP.

After you made the decision to use the ERP system, did you use a project team? Yeah, it is a project team, together with the consultant.

You did not think about doing it by yourself? No, it's too big. We have our own transportation for medical products, own transportation for other products, this is why nowadays, we do not run SAP in a pure version, and we run SAP Siemens release. So we made some adjustment to the SAP.

Was the installation phased? Sure, step by step.

Was there a lot of training effort during the implementation stage? Yeah, there was a lot of training necessary. We have some key users; we said ok who will be the key user here; who will be the key user there; we have 5-7 key users, they were trained very very intensively, and all the others got the basic training. So when one of the basic training guys have problem, so first of all he goes to the key users. If the key users can not solve the problem, then he goes higher to the SAP hotline, if they can not solve it, then they go to the higher lever.

Were there any customization efforts during the implementation stage? No, it's already done in the planning stage. Because we know the SAP at that time, we know exactly what we want and we did the modifications as early as possible.

I wonder to what extend has the customization effort been led by your business strategy? By 100%,
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So it is the strategy not the demands of the ERP system itself that decided everything?
Yeah, it's come from the strategy, and into the ERP system. It is not the ERP system; with the ERP system we try to apply our strategy. The market drives the strategy, not the ERP system.

Is there any specialized process in your company that is not supported by the ERP system?
Not that I know.

How widely is the ERP used in your company within the organization?
It's used in financial, production, purchasing, logistic and selling, but not the HR

Why has the HR department not adopted ERP?
Well HR is somehow involved in the ERP system, every employee is in the ERP system. Because we need his figures account to make the salary. In Germany we accumulate our travel expense by SAP.

What are the organizational functional changes in your company before and after the installation of the ERP system?
There is no big difference in organization than before, because we had a sort of ERP system before. We had already streamlined our business to using the ERP system. So there was no organizational change necessary with the adoption of SAP. We did some organizational change due to other reason, but not because of the SAP.

You have already adopted a process view of your business?
Yes, we started the process integration since early 90s.

Lots of companies failed in their attempts to implement BPR at that time.
Yes

In Europe, many companies have reported that they have not gained as many benefits from the ERP system as they thought; how is your ERP system? Does it achieve your goal?
Sure, I've heard complaints about ERP systems. Personally, I am happy to have SAP because it gives me transparency; it enables us to see what happened here and there. So from this point of view, I like it very much. I know there are some people who hate it, because for example, when you use ERP, you can trace back problems and so people
feel that they are watched. In the past people would say sometimes 'I don't know about that', but now we know exactly when messages and information are delivered and we know exactly when messages are opened, we know when someone starts the work flow, and when the job is finished, so we now know everything. This is what some people hate.

Is that true that most of the top management like the ERP system? Not the lower level staff?
Some of the lower level also like it, the very low level they know nothing else about this, some of the people they came to the company, they know nothing about the ERP system, and they get the job.

Do you think that your ERP system made any changes to your organizational flexibility?
It gives lot of flexibility.

Some people think that because of the standardization ERP enforces it will limit the flexibility of the organization, so what do you think of this? For example, do you need to make some modification to the process?
It is better not to modify the ERP system too much. You have to think of about it a little bit differently. You need to be process-oriented, and if you want to change the process, you will have to go into the detail to ask why you want to change the process. I can tell you a story that happened just three weeks ago. We found out that something is wrong. In the beginning, it had nothing to do with the ERP system. We made a monthly check on the data, and we found that one division was not inputting the data correctly, so we called them and asked them to correct the data set; a month later, the same thing happened again. After three months, the guy got a little bit mad, he came in and said "I hate it; I have done it, you said that I did not do it, but I did". I said that if you did why do we still have the problem. So we went into the whole process. Everyone complained about the ERP system and demanded some changes to it. So we called the SAP guy to change the process, but the SAP consultant said it would be better to leave it alone. And then, finally, oops, everyone realized that SAP works this way, and yeah, we were doing something totally wrong. What they had done was they took the data set here and they changed it in China, at the same time, other people were modifying it in Germany too. They guy did modification in Germany then downloaded the file to China and overwrote the already modified one in China. The guy who was correcting it here in China was having his data overwritten by the old data from Germany. So it was not the case that the SAP was wrong or was not flexible enough. If you implemented you ERP system
right, and something goes wrong, you have to ask yourself, what has happened. Is really that the fault of ERP system? It is relatively easier to blame the ERP system. Human error is the most common problem.

So people often do not fully understand how the ERP system works. Often we do not know how the whole system works together. We concentrate on monitoring our system. So, we are process oriented, 'Medical' is totally process oriented; you see, we have the supply chain process, customer relationship process, management process, and ERP system is rather a supporting process. We focus on developing our processes, but it is not a huge change. And you must be aware that the current SAP ERP system is a very powerful system. It can simulate lots of processes. But to the case you mentioned, I agree, we constantly update our own processes, and sometimes it might be necessary for us to adapt our ERP to our business processes. But it is not a huge adaptation. That's why we have our own SAP team. They are always so called change requests, to modify our ERP system. But it is not huge; it may need a little change here, or there. I will address this to the ERP group and said, OK your system does not work here, I want to change. First of all, I have to tell them why I want to change it. Then I must prove my idea. Then they will go into the situation and check and if the team come up and said yes, it is necessary to adapt the ERP, so we adapt the ERP system. I don't know exactly how many adaptations a year. But currently it is almost at least one adaptation a month.

Don't you think that this will influence your flexibility?
You have to be careful here. No matter how competitive the market is, I can't change our processes very fast. We have to consider the cross functional team here. I can issue changes every day every minute. But this will then be transferred to the change request team. If it is a small change, I can get this done by phone to get an agreement. If it is a big one, the issue will be discussed by the team and then decision made. This way change is controlled and then nothing will be missed.

Did you need to recruit new staff because of the adoption of ERP?
Oh, we recruited at beginning. For the medical group, we just hire couple of new people, but others are converted from internal. Not too many.

They were people with experience of ERP?
Yes
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Since the adoption of ERP, have your staff numbers decreased?
No.

Why do you think this is the case?
We already had ERP beforehand, so we had a process view. This means we did start from nothing. In the nineties we did lay off some people. But it is not because of ERP. We were in a bad situation at that time.

Section C: Company Structural Change after ERP

How would you describe your company's structural configuration? Are there lots of hierarchical levels?
We have, our CEO, then group head, then there are 'division's', and depending on the division, there might be sub-division's, and then there is a process owner and under that people working on the process.

In your opinion, do you think there are too many levels of hierarchy?
It is OK.

Has the ERP system caused any change to the number of hierarchical levels?
Not really. We completed our changes in the 1990s. Before that, the story is a little bit different. But the change was not caused by the ERP system. We adapted our organizational configuration according to our strategy. The ERP system is a support tool.

Many ERP consultants say after the adoption of ERP, there is often a big change. Year, I know. You need clear lines of responsibility especially for financial areas. Often in China, lines of responsibility are not clearly separated. In Chinese companies, you have one big boss who is responsible for everything, but after that things are not so clear. This is what comes to the Chinese companies.

After you adopt ERP system, is that true that some of your subordinates are not necessary any more?
Yes.

Did you fire those staff?
No, we reassigned them to the other departments, or the other positions. Usually we do not lay off persons. If you come from nothing, according to my experience, from nothing
to ERP system, you will find that ERP will cut some jobs and also create some jobs.

Do you think that your present number of hierarchical levels and your present configuration contributes to your flexibility? Could you please give me some practical example for this?

Things work at a divisional level. We have the process owner, he will report to the divisional head. As to a division, it is a profit centre but not a cost centre. The divisional head will be responsible for the result of the division. He will have to coordinate different subordinate's work.

Is flexibility more related to the degree of decentralization?

Most of the supporting functions such as HR, accounting and IT are centralized. But the other parts of the business are rather decentralized, such as CRM, though part of marketing is centralized. You have to decentralize to a certain extent to handle the local differences.

Did this happen after the adoption of the ERP system?

Well, it happened at the same time. Once again, we changed our organization according to the market, the strategy, but not the ERP system.

So, like you said before, organizational structure is rather directed by your strategy.

100 percent.

Could you please give some example why the present low level of centralization contributes to your strategy?

Yeah. We focus on the customer. See here is my customer, here is my customer. Here our process focuses more on their own customers.

Do you think that ERP system supports this kind of customer orientation?

Sure.

To what extent do you think that ERP gives the support for your customer orientation?

80 percent.

The change is according to the strategy?

Yeah.
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Have you made lots of changes to your ERP system?
Yeah. We made some customization to our final requirement.

Can you describe to what extent decentralization affects your flexibility?
That is a hard question. I think a centralized management approach will be detrimental to the organizational flexibility. You know we were more like a huge battleship, we put so much power to this battleship. Like an aircraft carrier, it demands a lot of energy to drive this aircraft. It is difficult to manipulate this aircraft. But now by dividing it into different vessels, the more vessels, the more flexible. They can adapt more quickly. This is what we do business now through our divisions. So for example, there are three different markets we can use divisions easily to adapt to the different markets. But it would be difficult in a large homogenous organization.

How would you like to describe your Inter-department relationships? Do you think they are good?
Yes, it is good.

There is a lot of interdepartmental communication?
Yeah.

Is the communication very effective?
Yeah.

Is this because of the help from ERP?
No.

Why?
No, it has nothing to do with ERP; I do not know who told you that. I mean, you can have the basic ERP system, but communication is always related to the people. I mean you can have the best ERP system in the world, if the people do not talk to each other, if you don't have people willing to talk to each other, it won't help you. So it is about the people, it's the people make things happen.

Why do you think people communication so effectively here?
All the lines of responsibility are very clear we found, everyone knows who's responsible for what, and so people just have to be open and encouraging.
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You have an open door policy?
Sure, I have the door open all day along, most of the time, I mean when I come in, about 7 or 7:30 in the morning, and I leave at 5pm, the door maybe only closed for an hour. All the people know that as long as the door is open, they can come in whenever they want.

Most of the top managers do that?
Yeah, when I go to Beijing, the door of my boss's office is open.

Do you think it is the result from the culture? Organizational culture?
Yeah, it is from the culture.

Do you have a special team to do that? To be responsible for communication?
No

Do you think is your current inter-department relationship offers good support to your strategy?
It is a good support, but it can be better. It can be improved.

Would you like to give some suggestion for the improvement?
It will improve, as we work together. We are going to move a lot of people from Beijing to Shanghai soon, and when we are altogether, it will be a lot easier. The problem with communication is with communicating long distance.

So you think face to face is better?
Yeah, if I talk to my people in Beijing, it’s lots easier to sit in front of them, do face to face communication. That’s better than just using the phone all the time.

So you use gesture and body language.
Yeah.

Do you think your inter-department relationship at the moment contributes to the degree of the flexibility?
A lot. Good communication is the first important thing for flexibility.

Can you give some practical example?
For example, we do lots of communication with the suppliers; Fiona, my assistant, can not perform her job 100 percent unless we communicate. I can start to write a lot of emails and lots of memos, but nevertheless, if she needs more information, she needs it
first hand information, she comes in at least once a day for an hour, and I tell her how to deal with different issues. But I also ask for her opinion on what she thinks of situations and how she would solve the situation? I try with this open communication also to teach people, because the people have to know why I make the decision, why do I make the decision this way around, they have to understand, so they can make decisions in the future.

I know you have worked in Germany and the USA, do you think you can apply good practices you learnt from there? Yeah.

Do your colleagues here in China work in similar ways to your colleagues in Germany or the USA? Most of them do, some of them not. Here in China some of them still think only about the big boss, but from my point of view, that does not help, because I will leave in 2 years, and then someone has to take over, someone must know why we came up with this strategy, someone must understand how do we continue; someone has to tell my successor, we did it this way because of this and that. So communication is the most important thing.

Is the working more or less standardized than before the ERP adoption? It's now more standardized.

Do you think this is better? Yeah, in some cases, it's a lot better.

Why? As I told you before, if the process is standardized, people can follow steps one, two, three, four, five. If you do not have this standardized process, you can miss things out.

Do you think this serves your strategy? This does not support strategy at all.

So you have to work according to the process specifications? Yes. We have to comply with the FDA regulation, so we have to go through the process.

But doesn't this really limit your flexibility, right? As many people say, now I have to do this, but I should do this, this will definitely
somehow give us some inflexibility, but this situation gives us much more flexibility in all the other areas, where we need it more.

Can you give some example?
I have some topics for example; we introduce the ERP system in SCMR in SEP, 2005. Before that, this department had their own IT. Before ERP what happened was, the guys in Shenzhen had to report their purchasing numbers every three months to Germany and to me, and it would take 24 hours to generate this data. Now with the help of SAP, following all the steps allows them to cut the 24 hours to one hour. It is because of the ERP system. We have a program in Europe that allows me to analyze my purchasing data, out of SAP, what I do, I download all my purchasing data once a month into this program, then I can analyze all my purchasing volume. This report probably takes me 5 minutes.

Do you think you are a person that likes to have more control?
I support my people, but I don't want to control them.

Do you want to control the person by the process?
I control them by the result; I give them the process.

You design the process?
There is the process already, if they follow the process, I have the result.

So you do not want them to make decisions on their own?
No, they have to follow the process, then I can check all those steps if I need to, so I can easily go in and say I will do a random check now, provide me from case one to three, provide me the data........So it's relatively easy, cause they already know the whole thing.

Someone said that the ERP is a tool, is it offers you the option to centralize or to decentralize? If the leader wanted to control the process, most of the time he will centralize? Do you think you centralize the process?
Sure, you should centralize the power sometime, I can go and check the SAP and check the whole thing now. With the ERP system, I get the responsibility. This is what I do, I check SAP and to find what the situation is.

Do you think that a centralized structure is better? Or the decentralized one?
First of all, I am in favour of decentralizing, I am not the guy who wants everything
centralized, but as a supervisor, I am have the tool to control my people as necessary and see how they are performing their process. At the end of the day, if I promote them, I do not promote them because they follow the process 100%. I promote them on if they are successful or not. They are very successful when they follow the process, a colleague of mine ran a process check over the last year, and we see the result. The people who follow the process make the best profits. The people who do not follow the process, they have a lot of work at the end of the day and do not have much profits.

The present process is the best one?
Yeah.

Section 4: Concluding Mark
So your ERP project has achieved its objectives?
Yes, now we still have some process inherited from past, and we will shortly eliminate the old processes and have 100% ERP processes, because the ERP process makes it more flexible, makes it more visible, and makes it more reliable.

Has the organization working practice been changed according to the ERP?
In Europe, yes. In China, no.

Do you want to do change them?
I have a process which is used in China; this process for a certain job is out dated, because this process was developed before we had the ERP system in China, and this process works very well. It works nowadays also besides the ERP process, but I would like to change it according to the ERP process.

So you think the ERP really provide some good tools?
Yes, unfortunately it is not recognized by some of the people now, and I would like to change this, the ERP process is a lot easier, it's faster, it's shorter, it's more and more visible, more reliable, accurate.

Do you think your implementation of ERP has been a successful one?
Yeah

Do you evaluate it from a customer perspective or user perspective?
That is simple, the implementation was done from a user perspective. If I am satisfied with the ERP-system, and the performance of ERP, if I am satisfied with the data I can get from the system, I am pleased with the Implementation. If I am not satisfied with the
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speed, with the performance whatever, then I have failed.

Has the ERP implementation been asses from the whole organization's perspective?
Sure, but it was done by the guys who were responsible for implementation, because in that case, I am only a user. I use the ERP system and I can tell you if it works as a user. On the other hand, the guy who undertakes the process checks, who implement the SAP, they have to evaluate if the ERP performs as it was designed to do.

If you look back, what kind of improvements and suggestions would you like to give?
We should train the people better before we implement the ERP system.

Was most of the training in-house training?
Yeah.

Did you find that people had more or less responsibility than before?
Some people have less responsibility than before, some people have more responsibility.

Do you think that this kind of change results from the adoption of ERP?
Less responsibility is not because of the ERP system; our goal is to raise our volume always as twice as much as the GDP of China. That means we need more people at lower levels.

Do you think ERP provides you with quality internal and external information for your decision making?
Sure, enough
Section 1: General Characteristics and Strategy

Is your company a listed company?
A listed company but it is controlled by the State. It is quite complex. We call it State controlled list company.

How many shares are controlled by the State?
35%

How many employees have you?
Around 24,000.

Can you tell me your corporate objectives?
Our company slogan is “highest quality, lowest cost and globalization”. Our long term objective is to become the world’s top commercial motor manufacturer. We plan to expand our scale to be one that can manufacture 1 million commercial motors per year in 2010. To be simple, we need to be the leading one in the motor industry.

What is your present situation in this industry?
We are ranked number 5 in China motor industry and number 1 in commercial motor sector.

Is your strategy a planned one or an emergent one?
A planned one. Our long term planning span is around 5 years.

Will you often adjust your strategy according to the environmental change?
Yes we do. But the change or adjustment will not be significant except where something has happened such as natural disasters, economic system changing, and national economic crisis. And every year we will make some policy.

Here are the descriptions of four kinds of company; could you please choose one that best matches your company?
No one can exactly describe our company but C [Analyzer] is much similar.
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Section 2: ERP

Tell me about your ERP system?
We have two sets of ERP systems. Our sales module is from SAP and other modules from Yongyou.

Few companies adopt more than one ERP system?
Don't worry. There will be no problem for our ERP system, we can connect the two ERP systems well though the orders.

How about your central database?
They are separate. Every ERP system has its own central database.

Does this create some problems of information exchange?
No. You need to properly connect them together.

When did you install the ERP?
Last year.

Was it a phased installation?
The situation is like this. We have lots of factories and the ERP can't be installed in those factories at the same time, so it was a phased installation. We have eight main branded product lines. The ERP are implemented in those factories and product lines one by one.

Did you set any specific objectives for your implementation of the ERP system?
Of course. Our objectives are to integrate the businesses and the money flow. We need to strengthen our warehouse and materials control and management. Meanwhile, we also need to set up a kind of mature information system, with accordance to the Chinese motor selling features, to control the credit risk.

Is there a big difference between Chinese motor selling and foreign countries’?
Yes. Such as the consignment arrangement.

Is there any other objective?
We need to improve our management.

Is cost reduction also an objective of ERP adoption?
For the sales system, the main cost control is put the on warehouse. The expense of the
sales includes travelling and advertisement. These are solved by the system. At the moment our main improvements are that we can effectively and efficiently contact our customers, and we have an improved products and goods moving speed. Also meanwhile, our efficiency has been greatly improved. For example, now it is not necessary to send lots of time faxing orders everyday. The only thing you need to do is to logon the system.

Is your ERP project supporting your strategy?
Sure. ERP must serve the strategy and the organizational structure of a company. Our approach here is to install an ERP system in every factory and our sales department will have its own. The Sales ERP will transfer all the orders to different factories. All these could not be managed through one platform.

Can you give some example how ERP could support your marketing effort and other strategic issues?
I think that ERP doesn't have strong relationship with the marketing strategy. The information platform will not have significant influence on the market sales. It works more like a kind of enterprise management. It could help you to improve your management capability, to normalize your management, to normalize your processes, to raise the logistic speed and to reduce the in-between communication cost.

Can you tell me why your top management wanted to implement ERP system?
What we aimed to do was to informationize the company. The word 'informationization' here has several meanings. Firstly when the enterprise is growing the number of staff will grow fast. Accordingly, with the fast increase of employees and the volume of the businesses, there will be some common problems associated with the big companies, such as reduced efficiency. By proper 'informationization', we benefit from the improved information sharing, improved efficiencies, and reduced cost. Secondly, the informationization helps to standardize our management and processes. We need to normalize these two respects. In my opinion, all the enterprise needs to adopt ERP. It must do this. If not, you may not survive in today's highly competitive market arena.

So you think that ERP is a qualifier for market competition?
Yes. It is compulsory. And the informationization, which covers more than ERP, should be one of the core competences of a company. To compete, you demand good products, strong marketing capability and also the comprehensive strategic management capability. In my opinion, informationization will change its traditional role and will draw more and more attention. One day it will become without question core competence.
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I thought that QAD's ERP system had a large share in the motor manufacturing industry in China, but you did not adopt this one?
No, that is not true. The main sector QAD serves is the spare parts manufacturers but not companies like us, who manufactures the whole motor.

You said that you have two sets of ERP systems; one is from SAP, from whom you bought another set of ERP?
YongYou, a Chinese Vendor.

Could you tell me about the installation sequence of these two sets of ERP?
Almost the same time. Our accounting department used YongYou (one of Chinese biggest ERP vendor; during past it focused on providing financial software) long time, if you want to regard it as one of ERP part.

Did you visit some exemplary companies before the adoption of ERP?
Yes, we set our own rules for the choosing of ERP.

Did you customize SAP ERP before the installation?
Yes. A little bit. There are some difference between domestic management and that of foreign countries. For example, the credit risks management system. And every enterprise has its own special characteristics; these are all issues we need to pay attention to before the installation of ERP system. We called the customization effort 'second time development'.

When did your 'second time development' happen, during the Investigation period or at another time period?
Commonly it is done in the investigation stage and during the system realization stage. We commonly carry out the business analysis; this analysis will also take into account our business blueprint, which covers most of the future processes; the future processes are to be realized by the system. When we have any incomplete function, we will need the second development, what would have been realized during this period is the system realization.

Then, which stage does the installation belong to?
The fourth stage.

How do you train your staff?
We have intensely trained our staff who are from the same functional departments. For
example, when we need to train the sales staff, we will firstly notify their departments to confirm all the attending staff and the key persons.

The Key person plays important role?
The training for them is more intensive and they would have the responsibility to supervise and advise their peers. We firstly trained the persons who will use the ERP system and provided a relevant operational manual to them. During the installation process, those appointed key persons will supervise day to day works.

Is there any post-installation training?
No, there is not too much training after the installation. The main things we need the users to do after installation is to be familiar with the distributed manual.

Is the installation phased?
Yes.

In order to implement this ERP system, did you recruit new staff?
No.

Not even new IT staff?
To implement the ERP project, we can't depend on new staff. When we started this project, we selected one top official to act as the leader of this project. We also divided the team into lots of different sub-teams such as the one responsible for data, for quantitative sales, for warehouse, for distribution, for purchasing, and for logistics. Every sub-team was headed by a team leader who is professional and only responsible for their team. Meanwhile, every functional department sent one expert to join the team. To be simple, the team responsible for warehouse had one staff from warehouse department, and some staff from the other departments such as distribution, ordering, accounting. All these persons formed a full time project team. Also, an external consultant joined the project team. This is the main organization in charge of ERP implementation.

Is this team led by VP?
Yes it's me.

The project manager will be responsible for all affairs from the startup to the final running?
Yes.
Did you lay off any staff after the adoption of ERP since it can help you to improve efficiency?
Yes, it does improve efficiency but this was not only as a direct result from the implementation of ERP. For example, after our after-sale platform had been fully installed, our warehouse cost has been reduced by twenty millions; the cost of after-sale services has decreased by sixty million RMB. During that time we also lay off around fifty employees.

But you should also take into account the growth of your business volume?
Yes.

So generally, could you give me an estimate of how many percent of the staff become redundant after the implementation of ERP?
It is around 5-10%. But remember that the reason we adopt ERP is not to reduce staff. This is a kind of side effect.

How about the growth of your business volume?
It grows more than 16 times than the time we were set up in 1990s.

Sorry, I mean the growth after the adoption of ERP?
Our yearly growth is currently around 10%. It has been much faster than before, around 30-40% per year. The recent growth after the adoption of ERP has kept at 10 percent. Because we were already a quite large company, it is not easy to keep a high growth speed. Our annual production capability is 400,000 motors.

Does ERP help you to improve the flexibility of your company?
The company is more normalized.

How does ERP influence your production flexibility such as for the production of the bespoke motor?
It should be the similar to before. There are no many bespoke motors in China. Instead, very few commercial motor customers buy bespoke ones. The commercial motor is different from the family car.

Can I say that after your adoption of ERP you could accept the orders that you can't do before?
To be honest we never met the circumstance that the order is too big to be accepted or finished in short time. Our production is quite different.
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How about your production cycle, increased or decreased?
Yes the production cycle is reduced.

Could you provide a rough percentage of the reduced production cycle?
No, this is not easy to say by detail number. We are a company different from others. We don't operate according to orders, so it is impossible for us to calculate the exact number. Our common practice is to manufacture the motors and then put them into stock. Thereafter, we will send our sales staff everywhere to sell them.

Do you think that ERP could help you improve your response speed when you need to adjust your whole organization?
I don't think that ERP could do this. A company's organizational change capability and speed do not have any relationship with its Information system. The organizational structural adjustment will have some effect on the ERP system, depending on what kind of adjustment you want to make. For example when you need to change your business processes, then you need to change your ERP. But when you only want to adjust some personnel issue, or when you want to totally change your party council [Chinese communist party basic unit in some companies], you don't need to change ERP. But in sum, I still think that ERP may indirectly influence the stability of a company.

Can you please tell me how ERP could influence the organizational stability?
I don't mean that the organizational flexibility will be improved. Instead, if the organizational structure needs to be changed suddenly, lots of jobs have to be done with the purpose of changing ERP system. So from this perspective, ERP will limit you ability to change.

Is every function covered by ERP?
Not all. Party council can't be covered by ERP.

I mean the normal corporate functional departments such as accounting, warehouse, and information system?
At the moment, our purchasing department does not have ERP yet, later we will strengthen the purchasing function and the management of the relationship with the suppliers. Most of the other functional departments have ERP installed.

How about your HR department and quality control?
The human resources have ERP installed. But our quality control does not have ERP system; we have in-house made software for this purpose.
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Could you please describe the ERP modules you installed?
There are lots of them. The main modules include accounting, material, sales, DMS that I don't think belong to the ERP; it is sometimes difficult to say which part belongs to ERP, there seems no strict definition for ERP. Maybe the domestic and overseas ERP definitions are different. At present, we have lots of systems such as HR, Video conference, financing and accounting system, payment settlement system, DMS, business administration system, distribution system, SAP's MM module, and SAP's SD module.

Yes, there are lots of different understanding and definitions of ERP. According to my own understanding, ERP is more than a concept rather than a strict definition? It evolves from MRP, MRPII. If we compare them and define the ERP by comparison, I myself would like to regard those that to link its company's processes and different functional module through a central database as ERP. Probably. The traditional and the original meaning of ERP are to help manage the company.

All the information flow could be tracked by your central database system? No, some platforms have their own independent database. The connection among those databases is through relay station or application layer. By this way they realize the information exchange.

Are there any data conflicts? They are coordinated, it is connected by the relay station or so called application layer, if the other system require this information we could send this to them. Some are real time some are not. The data will commonly be updated daily or per five minutes. From the operational perspective, the information need to be updated fast, we will do this every five minutes. Otherwise, updating will be on daily basis. These will be done according to the corresponding strategy. All the information flow and business processes have their logical relationship.

It seems, from what you said above, that your ERP system is perhaps not so processes oriented? It is rather than a concept. The processes are realized through application layer.

Section C: Company Structural Change after ERP

Could you please describe the company's configuration?
Group with its SBUs
Beijing Motor Corporation has dominant control on you?
Yes

So your top level of your company is a director board?
Yes.

So what is next?
General Manager.

Is that VPs the next layer under GM?
Yes,

How many VPs do you have?
9.

They are then responsible for different departments?
Yes.

What is the next?
Departmental manager,

Any vice manager in every department?
Yes. Our organization is organized by functional departments plus SBU. All the functional departments stay in the headquarters. Every department has its own manager and vice manager. After that, there are different offices in every department. Those offices are headed by office dean and vice office dean. The next level is the staff.

What do you think about your company's number of management level? Is there too many?
It depends. This number is proper for a developing company whose growth rate is so fast. This is because in the course of fast expansion we need also recruit and train some staff with high potential. The vice dean or vice managers are indeed the people with high potentials.

Is the line of command too long?
No, not very long.
From board directors to the shop floor staff?
Our board directors do not participate in the company management.

Even so there are still at least six middle levels?
Nearly so.

Although this may help you to train the persons with high potentials, this will also reduce your response capability by information distraction or information distortion or longer reporting processes?
It's Ok. Lots of foreign companies have more than ten levels e.g. Benz. I think the problems you mentioned above don't result all from the longer line of hierarchical levels. These depend more on the company and staff's initiatives (Culture); of course if there are too many level of layers, it will reduce the communication efficiency. But what is more important is culture. And indeed the vice officers have different responsibilities. For example, the vice officer pay more attention on the detailed affaires but the officer will be responsible for the whole department.

Your objective is to be leader in this sector; could you tell me your strategy to achieve the objective?
Highest quality, lowest cost, and globalization.

It seems that the first and second parts of yours strategy conflicts with each other. Do you think that it possible to make product that is of highest quality and also lowest cost?
Yes.

Don’t you need to emphasize one part of these two respects?
No. It is balanced.

By this, you want to attract a high number of customers?
Yes.

Do you emphasize the response speed to customers?
Yes. Our after-sale services have always been excellent. 24 hours calling center can deal with technical enquiry; we also provide on-site-help and other services.

Your SBUs are Independent, that is responsible for its own profit and losses?
Yes. There are three SBUs, one manufacturing luxury coach and one for engineering motor. All the other factories are directly managed by the headquarters.
Appendix X

Your sales are independent from headquarters?
Yes.

Do you think that present number of management levels is appropriate for your strategy? Does it support your strategy?
Yes. Present organizational configuration is fine.

Could you give some example of how your configuration provides support for your strategy?
The general configuration of our organization helps us to strictly control the staff by close supervision from their superintendent. Also our SBUs are the units that can flexibly deal with the business issues that demand special attentions. It can also help us to quickly respond to the market. But we try to manage our mature products by the production groups, rather than SBUs.

To what extent do you think your SBU could support your strategy?
For the new market, this could respond quickly. From another perspective, it is also related with the group products.

Can you tell me in detail how SBU could work as you said?
It is good at cost control. Unlike the production groups, SBU will not have too many management layers. SBU could independently deal with its own matters, the only thing they need to do is to achieve the objectives set for them.

After the implementation of ERP, is there any change of the organizational configuration?
No.

But you said before that the ERP helped you improve your efficiency?
I think that the management level has a different meaning from the foreign companies. It represents a kind of an administrative level and welfares. It is not so closely linked with everybody's position. But ERP has much say on the business processes and the business processes care more about the positions.
Appendix X

Can I say like that, since most of your officers could get help from informationization, most of them could deal with more businesses and supervision tasks, so some of middle line of managements will not be necessary any more?

No, because the management level is not to be added or eliminated, it is not a simple question like that. And also I think that the standard span of control is around 6-7 persons. The number of staff could not be managed if there are too many people. You say here Manager Lai has more than 100 persons under his supervision. Do you think that it is possible for him to supervise all of them? The number of levels depends on the workload and the number of staff under his control. So I don’t think that ERP could ultimately change this. What ERP can do is to standardize your processes and to improve efficiency and to share the information.

You said the standard span of control is 6 staffs, but since efficiency has been improved and information is well and timely provided, Manager Lai could supervise more staff?

But the improvement of informationization could not improve one departmental manager’s capability.

But the information is provided timely and exactly, to a large extent Manager Lai does not need to spend time on some supervision or communication tasks, he could then supervise more people?

But for a company, there are lots of management tasks needed to be done which ERP could not help. For example, I need hold a meeting, to write schemes, to choose staff. These are the tasks that ERP could support.

So lots of management tasks do not depend on ERP?

Yes. I think that the operation and management of a company cover lots of issues. What ERP could cover may be only two tenth. If you need to develop a new product, you need to hold lots of meetings and this is what ERP could not substitute or support.

Is it possible that some meetings could be cut because of the running of ERP system?

NO. Because every meeting, in particular, the group top management meeting, need to discuss the topics such as monthly sales volume, the next month’s market forecast, the information with respect to our competitors; meanwhile, if we want to develop a new product, we can’t get that information from ERP. We must do this through market research, and we must have some discussion; also all these issues need to be done by
If your business processes are more standardized, perhaps the middle managers can more quickly find the information needed and so have time to control more people and the number of level could be reduced?
No, but how about the functions such as processes analysis, production development, these are what ERP could not change too much.

Don’t you think that present configuration will hamper your degree of flexibility?
No, not too much. This will be influenced more by culture. If everybody positively treats their jobs, there will be no problems with this flexibility. If everybody just stands there and don’t work actively, no matter how many levels of hierarchy would be set, company can’t be flexible. It is unnecessary to say that the many management levels will hamper the flexibility of an organization.

So the soft factors such as culture count?
Yes.

Are there more written rules and manuals than before?
Since we need to informationalize our company we need more rules.

Are those rules and manuals specific for the implementation of ERP?
Before the implementation of ERP, we have our own management methods and rules. After the adoption of ERP we will have to change our manuals, rules and the working practices.

Do you think that your manuals, rules, procedures and other description leave little space for individual flexibility?
Yes.

Working practices are getting more standardized?
Yes. You need do your job according to ERP procedures. For example, after the implementation of ERP you may need to input the data into the system quite shortly.

Do you think that highly standardization good or not good?
It’s good. This could standardize the employee’s activity and the way to do their jobs.
Appendix X

So you have assumed that more standardized activity contributes to the development of the company?
Yes. This is also true in foreign companies. We need to limit and control staff through rules and specifications, rather than by superintendent. Everybody should do his job according to rules and regulations.

It seems that more and more foreign companies try to control by feedback?
Yes, feedback is only part; you also need to control staff by rules and regulations. People are lazy. Without any limitation set by rules, staff may not be willing to work. If you let employee work as they want, they may not try their best.

This will also limit the employee’s initiative and creativity?
Yes. In manufacturing industry those who do not control or try to limit their staff will suffer from the economic losses. Most of the European and US manufacturing suffer.

That seems to be a problem of human cost?
Cost is induced by people. In any company, all the questions are the problems of people's problems; human being is the carrier. High stock level resulted from human problems; products that are not appropriate for market are also due to the human failure.

Is this kind of highly standardization supporting your strategy?
Yes, together with ERP they could standardize our working practices. That's good.

How are your interdepartmental relationships after the Implementation of ERP?
More fluent than before and it is easier to get agreed suggestion for proposed problems. We can easily trace the problems. As soon as we want to find out the problems we could easily find it. This is what we can't get when we do our job manually.

Much easier for team work and better cooperation?
Yes everybody is clear about what they need to do by now. This can help cooperate with each other.

How about the communication between departments?
Smooth communication.

Do you think that these changes directly result from the adoption of ERP?
Yes. It could help to clearly define the departmental boundary and staff's responsibility. I
Appendix X

will give you an example. We had a product line whose spare parts were purchased by two different departments, purchasing and production. There were always problems when dealing with the purchasing of these spare parts. When we implemented ERP, we had to redefine these areas and choose the best practices.

How much of the decision making is centralized?
Most of non-strategic decision making belongs to the middle managers.

So may I say that your company is one that is decentralized?
Yes.

Is this decided by strategy?
No, that is related to the company management basics, the issue of enterprise management rules. A company could centralize all its decision making right but the top level does not have so much time to deal with those things. So, most of daily operations and non-strategic issues must be delegated to the middle managers.

But strategic issues are decided by top level?
Yes. But there is an associated problems as well. It is not so clear to say what is strategic and non-strategic. In our company I can make a decision on a contract with a value under 200,000. And any contract with a value above 500,000 needs to be decided by GM. The board of directors will together make decisions for the contact with the value above 1 million. We also allocate decision making according to business systems. For example if a purchasing manager want to stop purchasing from some suppliers, he can make the decision on this. But if you want to add one engine supplier, the right lies in the hand of GM. For other spare parts, purchasing manager could decide himself.

Is there any change of degree of centralization after the adoption of ERP?
Yes.

How it was changed and could you give some examples?
Our purchaser could decide which product to purchase before because we didn't have an allocation ratio among different suppliers, and we could not check every document. But after the implementation of ERP, the purchaser does not have such rights.

How about the middle manager's decision rights?
No much change in total, but there are some adjustment among the different middle line managers. For example, some rights that belong to office managers may be reallocated. 
Appendix X

As to some specific departments such as sales, the middle line's rights are clearly reduced.

Does this change of centralization influence your flexibility? Getting more inflexible?
I don't think that the flexibility of a company could be ultimately influenced by this. Maybe lots of areas that are covered by ERP become inflexible. You should understand that the key to being flexible is to respond market changes quickly; and the response speed is strengthened by rules and regulations. Without rules and regulations you may find that company will have problems respond to market change simultaneously. This could not be done if you give too much flexibility to the links of your business processes.

Section 4: Concluding Mark

How do you think of your company's ERP project, is it a successful one?
It is quite successful.

Could you tell me up to now the main benefits you have achieved through this ERP project?
Starting from the basic numerical data, our services fee including after sale services are reduced by 40 percent. The reduced cost amounts to tens of millions. Our stock level has been reduced as well. Also the efficiency has been greatly improved.

How did you manage to reduce the cost?
The stock level has been reduced; the capital used for this was then reduced as well. With the sharing of the information, we could easily know the level of stock and how much needs to be purchased.

Is there any thing you would give more attention to if the project was to be done again?
Up to now we don't think there is any big problem with our jobs done for the implementation of ERP.
## Matrix Summary of Interview Data

<table>
<thead>
<tr>
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<tr>
<td>C1</td>
<td>SOE</td>
<td>Set up a mature IS for managing logistics, business processes and money flow</td>
<td>No change</td>
<td>Interviewee argued that ERP can't ultimately improve managers' capability</td>
<td>Some changes</td>
<td>Some decision rights transferred to ERP</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, Easily identified Problems and easily to get agreement</td>
<td>Yes such as reduction of production cycle, ERP normalizes and standardizes working practices.</td>
</tr>
<tr>
<td>C2</td>
<td>SOE</td>
<td>To cope with rapid expansion and to control organization</td>
<td>No change</td>
<td>Production is the department with most of staffs and ERP can't significantly help to manage those staff.</td>
<td>No change</td>
<td>Interviewee suggested that ERP has little influence on decision making</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
<td>Yes due to information provided by ERP, company can flexibly respond to market and effectively control organization.</td>
</tr>
<tr>
<td>C3</td>
<td>PV</td>
<td>To cope with expansion and to build a common IS platform</td>
<td>No change</td>
<td>Clearly told vendor that they won't do change to the configuration</td>
<td>No change</td>
<td>Interviewee suggested that ERP has little influence on decision making</td>
<td>Yes</td>
<td>Improved communication and reduced oral communications</td>
<td>No change, interdepartmental relationship is good all along</td>
<td>No, and the interviewee suggested that their ERP project was not successful.</td>
</tr>
<tr>
<td>C4</td>
<td>SOE</td>
<td>Headquarters made the decision to implement ERP.</td>
<td>No change</td>
<td>ERP can do little change to the SOEs and some restructuring efforts before ERP adoption</td>
<td>No change</td>
<td>Interviewee suggested that, without external pressure and incoming benefits, top manager would not change those issues.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No changes due to the nature of the company-SOE</td>
<td>Yes, company can easily deal with the production and operation by dint of the information provided by ERP.</td>
</tr>
<tr>
<td>C5</td>
<td>SOE</td>
<td>A management fashion</td>
<td>No change</td>
<td>Some flattening and downsizing effort before ERP adoption</td>
<td>Decentralized</td>
<td>The timely and improved information and the clarified responsibilities enable middle line manager to make decision with confidence.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, due to the clarification of responsibilities</td>
<td>Yes, the timely and accurately provided information by ERP can help management better respond to market.</td>
</tr>
<tr>
<td>C6</td>
<td>PV</td>
<td>Key customer required them to do so.</td>
<td>No change</td>
<td>Not necessary to change configuration on the reason of ERP adoption</td>
<td>No Change</td>
<td>Interviewee suggested centralization is greatly influenced by leadership and ERP has nothing to do with degree of centralization</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, but there are some human discretion</td>
<td>No significant changes. Before the adoption of ERP, they have had set up good working practices which can help them quickly respond to market. Those working practices were not changed by ERP.</td>
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<td>C7</td>
<td>PV</td>
<td>To provide timely information for operation</td>
<td>No change</td>
<td>Interviewee argued that ERP has nothing to do with organizational structure</td>
<td>No change</td>
<td>Interviewee argued that ERP has nothing to do with centralization</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
<td>Yes, the interviewee suggested that the improved efficiency help them to better cope with the customer requirements.</td>
</tr>
<tr>
<td>C8</td>
<td>SOE</td>
<td>Headquarters took the decision to implement ERP</td>
<td>Yes</td>
<td>The efficiency provided by ERP help to reduce the number of staff and thus helps to reduce the number of hierarchical levels.</td>
<td>Decentralized</td>
<td>The clarified responsibility helps to delegate decision making.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, Clarified responsibilities</td>
<td>Yes, better production management and effectively coping with the crisis such as SARS (this is a Pharmaceutical company)</td>
</tr>
<tr>
<td>C9</td>
<td>SOE</td>
<td>To better cope with the management problems and bad logistics management</td>
<td>Yes</td>
<td>Changes due to the efficiency provided by ERP, which help to eliminate some middle level managers</td>
<td>Decentralized</td>
<td>The clarified responsibility, processes, and the improved standardization help to decentralize decision makings</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, specific and clear responsibilities of each staff</td>
<td>Yes, streamlined and rationalized processes, better working practices from ERP, and timely information all enable quality decision makings in response to the market changes.</td>
</tr>
<tr>
<td>C10</td>
<td>SOE</td>
<td>We needed to replace legacy IS to support our operations</td>
<td>Yes</td>
<td>Changes due to improved management information and consequently it is not necessary to have more management layers.</td>
<td>Decentralized</td>
<td>ERP enables a decentralized structure.</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>Yes, due to clarified responsibilities.</td>
<td>Yes, it helped on the accumulation of expertise and the provision of better working practices</td>
</tr>
<tr>
<td>C11</td>
<td>SOE</td>
<td>Headquarters took the decision to implement ERP prior to listing the company on the stock exchange.</td>
<td>No change</td>
<td>There are some restructuring efforts before ERP adoption</td>
<td>No Change</td>
<td>Interviewee suggested that the company is an SOE and has no motivation to change organizational structure</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
<td>No, because this is a SOE and its production volume has been given by State. Flexibility is not valued in this company.</td>
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<td>C12</td>
<td>FOE</td>
<td>Corporation policy demanding worldwide subsidiaries to adopt ERP system.</td>
<td>No change</td>
<td>BPR before ERP adoption</td>
<td>Changed</td>
<td>The issues relating to purchasing and accounting were centralized but the other normal operations were decentralized.</td>
<td>No big change, did BPR before</td>
<td>Communication is good all along</td>
<td>Emphasized teamwork with and without ERP, No big changes</td>
<td>Yes, timely management information, streamlined processes, and modularized operation help manager to better cope with required changes.</td>
</tr>
<tr>
<td>C13</td>
<td>SOE</td>
<td>Corporation policy demanding worldwide subsidiaries to adopt ERP system</td>
<td>No change</td>
<td>There are some restructuring efforts before ERP adoption</td>
<td>Changed</td>
<td>The issues relating to purchasing and accounting were centralized because headquarters for a long time wanted to centralize those decisions. ERP adoption enabled this centralization.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
<td>Yes, greatly improved production flexibility and ERP offered versatile means of organizational control.</td>
</tr>
<tr>
<td>C14</td>
<td>SOE</td>
<td>To better align their off-site sales department with the other parts of the company</td>
<td>No change</td>
<td>They have tried to flatten organizational structure before.</td>
<td>Decentralized</td>
<td>Clarified decision rights, due to the installation of ERP, help middle line managers to make decision by their own.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, they can trace problems easily and argue with evidence</td>
<td>Yes ERP provided timely and accurate information and thus management can deal with problems emerged. Interviewee suggested that ERP might place more limit and control points for lower level staff and thus limits their flexibility.</td>
</tr>
<tr>
<td>C15</td>
<td>FOE</td>
<td>Emphasis on efficiency and connection of material flows</td>
<td>No change</td>
<td>Interviewee argued that ERP has limited influences on configuration</td>
<td>No Change</td>
<td>Interviewee suggested that centralization is a matter of leadership.</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, but there are still some conflicts</td>
<td>Yes, the information provided by ERP can help them get clearly understanding of their operation and trace the problems in processes.</td>
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<td>C16</td>
<td>PV</td>
<td>To cope with rapid expansion and to better manage their logistics and material flow.</td>
<td>No change</td>
<td>Restructuring efforts undertaken before the ERP adoption</td>
<td>No Change</td>
<td>Interviewee suggested that strategy rather than ERP has more influence on the issues of degree of centralization</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, by dint of clarified responsibilities, but not significant.</td>
<td>Yes, it reduced production cycle and copes with large volume of orders without increase of staff. The information provided by ERP can quickly trace and deal with problems.</td>
</tr>
<tr>
<td>C17</td>
<td>FOE</td>
<td>Corporation policy for worldwide subsidiaries to adopt ERP system.</td>
<td>No change</td>
<td>Companies don't want to change general configuration and it was suggested that ERP adopters would be able change their structure only after they fully realize the benefits of ERP adoption, after a period of time of using ERP.</td>
<td>Centralized</td>
<td>Top managers want to get more control on decision makings</td>
<td>Yes</td>
<td>Improved communications</td>
<td>Yes, reduction of problems resulting from unclear responsibilities</td>
<td>No, interviewee suggested that ERP places too much limit on the individuals.</td>
</tr>
<tr>
<td>C18</td>
<td>PV</td>
<td>To improve their management capabilities and to gain more efficiency</td>
<td>No change</td>
<td>Too much politics within the company</td>
<td>No change</td>
<td>Due to top manager's willingness to make decision by themselves.</td>
<td>No change</td>
<td>No changes</td>
<td>No changes, interdepartmental relationship is good all along</td>
<td>No, the interviewee suggested that the company was enjoying great flexibility all along, without and with ERP.</td>
</tr>
<tr>
<td>C19</td>
<td>PV</td>
<td>Going public, to improve their management capabilities and to cope with expansion</td>
<td>No change</td>
<td>Interviewee suggested ERP is used to fit their structure, rather than vice versa</td>
<td>No change</td>
<td>They only want to change their information management rather than the decision making rights.</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>Yes.</td>
<td>Yes, while interviewee suggested ERP can place limitation on flexibility, this can also benefit whole organizations due to improved practices and shared information.</td>
</tr>
<tr>
<td>C20</td>
<td>PV</td>
<td>To strengthen their data and financial management</td>
<td>No change</td>
<td>Interviewee suggested it is not necessary for them to change configuration due to their small size.</td>
<td>No Change</td>
<td>Interviewee suggested that ERP adoption has nothing to no with centralization.</td>
<td>Yes</td>
<td>Improved Communications</td>
<td>No Comment; Interviewee regarded as sensitive</td>
<td>Yes, the standardized working practices, procedures and processes help management to quickly respond to market.</td>
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Published Paper

Conference Paper