

UNIVERSITY OF SOUTHERN QUEENSLAND



**THE ADOPTION OF BUSINESS-TO-BUSINESS SYSTEMS BY
SMALL AND MEDIUM ENTERPRISES IN AMMAN
AND THE PERCEPTIONS OF ITS INFLUENCE ON
PERFORMANCE AND EFFICIENCY**

Dissertation submitted by

ANAS A. AL-BAKRI

Bachelor of Business Administration – ANU (Jordan)
Master of Banking and Financial Sciences, Banking Specialisation – AABFS (Jordan)
Master of Applied Finance – UWS (Australia)
Master of Information Systems – UOW (Australia)

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Faculty of Business

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CERTIFICATION OF DISSERTATION

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

Anas Abdel Karim Moh'd Al Bakri

Signature of Candidate

15/02/2011

Date

ENDORSEMENT

Signature of Supervisor/s

Date

Signature of Supervisor/s

Date

DEDICATION

To my dear wife, Ola

Who continues to learn, grow and develop and who has been a source of encouragement and inspiration to me throughout my study, a very special thank you for providing a 'writing space' and for encouraging me through the years of writing. And also for the numerous of ways in which, throughout my study, you have actively supported me in my determination to find and realise my potential and to make this contribution to our world.

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To my lovely daughters; Saba and Hala.

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Meran, Mohammad, Marwa, Isra, Rawia and Malek.

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ABSTRACT

The aim of this research is to identify the factors that encourage or limit the adoption of Business to Business (B2B) systems in Small-to-Medium Enterprises (SMEs) in the city of Amman, Jordan. The current research referenced in this paper assessed and verified the performance of SMEs as related to improvements in performance and efficiency, as measured by influential factors that related to the B2B system adoption in SMEs in Amman. Within the current research emerged the importance for the adoption of B2B systems for SMEs in Amman for enhancing their performance and efficiency, so that they may become much more useful, effective and productive. The current research was conducted with both qualitative and quantitative approaches to explore both the process of adoption and implementation of B2B systems in SMEs in Amman, and the perceptions of the effect of these changes as measured in terms of performance and efficiency. Within the research, a questionnaire was used as a method of producing quantitative descriptions of some aspects and issues of the study population. The questionnaire focused on the adoption of B2B systems in SMEs in both industrial and services sectors in Amman and the perceptions of SME managers in terms of how their application resulted in changes in of performance and efficiency improvements.

The questionnaire was pre-tested for its validity and reliability, and quantitative statistical of methods such as factor analysis, t-test, analysis of variance and correlations, were employed on the interview and questionnaire itself. In all, 500 SMEs from the AHI (2008) were contacted to participate in this questionnaire, of which 368 SMEs

completed it. This equates to an overall 73.6 percent response rate ($368/500 = 73.6\%$). After screening the data, responses were analysed using Confirmatory Factor Analysis (CFA) and Structural Equation modeling (SEM). The results of factor analysis represented the construct validity of the questionnaire in this research. There were ten factors and 75 items examined by factor analysis in this research. All the factors and items deployed were found to have satisfactory alpha values that were higher than 0.70 percent established for exploratory research. Hence, based on the findings of these tests, it was concluded that the items and factors in this research met the various criteria for evaluating and demonstrating satisfactory social and business studies. As all factors were loaded above 0.50 percent on the factors that they were used to measure, the relationships among factors (First and Second-Order factors) to test the convergent validity through a perfect simple structure and all Eigenvalues are greater than 1.0, thus, it was evident that a simple structure existed in this model. The SEM analysis supports the proposition that the adoption of the B2B systems by enterprises reflects the internal and external organisational factors sufficiently to represent them as a single construct in structural models.

This research has five general findings about the perceptions of SME managers in Amman regarding the adoption of B2B systems and its effects on SMEs' performance and efficiency improvements. The first finding was that B2B systems have a strong positive correlation with SME's performance and efficiency, which suggests that the SMEs' performance and efficiency improved as the extent of the B2B system adoption increased. The second finding was that the internal and external organisational factors' influence on B2B system adoption should be assessed and understood before the

improvement in SMEs' performance and efficiency could be fully realised. The third finding was that the effect of B2B system adoption was fully mediated by improvement in the SMEs' performance and efficiency. The fourth finding was that the four performance factors: namely productivity, sales, profitability and costs; and the three efficiency factors - namely operation efficiency and inventory management and control and Procurement Business Process (PBP), were the most important contributors and measures of the SMEs' performance and efficiency in Amman. The last finding was that a new continuous scale can measure the factors of B2B system adoption, and SME's performance and efficiency improvements.

The effects of B2B system adoption in SMEs in Amman are fully mediated by SME efficiency improvement. Productivity, costs, PBP and operation efficiency were more affected by B2B system adoption than other factors due to their structured characteristics. This finding is supported in the management literature, which suggests that there are improvement inter-dependencies among SMEs' performance and efficiency outcomes where an improvement in one area leads to improvement in others. The fully mediated relationships between B2B system adoption, SMEs' performance and efficiency improvements concluded that changes in productivity, cost reductions and sales processes were the drivers for improved performance. At the same time, it was concluded that changes in PBP and operation efficiency were the drivers for improved SMEs' efficiency. While the adoption of the B2B system enables improvements in business processes that are otherwise difficult to achieve, such as automation of administrative functions and the global transactions of electronic documents, the evidence in this thesis concluded that SME performance and efficiency improvements

were not improved without changes in the business process that initiate, receive and use the information. For example, while the sharing of valuable information is much easier using IT, it could theoretically occur through a variety of media including fax and digital or paper documents. However, these information media are more costly to operate and transfer than most IT applications such as B2B systems and may suggest why some information was not shared between Trading Partners (TPs) prior to B2B systems.

This research demonstrates that measuring the internal and external organisational factors provided a more parsimonious model with higher statistical power. This means that both internal and external organisational factors that influence B2B system adoption are necessary for explaining the level of variance in SMEs' performance and efficiency as demonstrated in this research. The findings also suggest that the methodological results and contributions derived from measuring the influence of the B2B system adoption on SME performance and efficiency in Amman on a continuous scale appears to capture dimensions of the technology not previously measured in the services and industrial sectors in Amman. Specifically, it measures varying degrees of the B2B system adoption rather than simple presence, i.e. either the technology exists or not. It also explores various dimensions of the activities forming the B2B systems internal and external organisational factors that have not been collectively measured in a single study. This involves measuring SMEs' strategic, SME managers' perceptions, readiness and external pressure by TPs and internally on a continuous scale. This research found that automating the PBP allows timely and accurate estimation of the material needs of the SMEs in Amman. Activities of PBP include placing and confirming order to and from TPs online, as well as checking of order status. As

discussed earlier, these activities can be performed online through TPs' websites and/or through e-mail. In addition, SMEs' and TPs' activities involve the collection and processing of information about potential TPs. This research contributed the following conclusions to the literature and SME managers in Amman:

1. The B2B system adoption in SMEs in Amman has had a positive influence on SMEs' performance and efficiency improvement.
2. The external organisational factors such as readiness and external pressure by TPs were most important factors influencing the adoption of B2B systems.
3. Some of the factors in SMEs' performance improvement, such as productivity and costs, appear to be factors that are more affected by B2B system adoption than other factors.
4. The evidence suggests that some of the factors in SMEs' efficiency improvement, such as PBP and operating efficiency, appear to be more factors that are affected more by B2B system adoption than other factors.
5. The findings suggest that the effect of B2B system adoption on profitability is indirect, mediated by other factors such as productivity, costs and sales.
6. The three control variables: enterprise size, B2B systems' use duration and economic sector in this research have had neutral effects on B2B system adoption in SMEs in Amman.
7. B2B system adoption can remove many of the competitive advantages of larger enterprises in Amman and provide opportunities for SMEs.

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GLOSSARY OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ADSL	Asynchronous Digital Subscriber Line
AHI	Amman Handbook Index
AIC	Amman Industry Chamber
ANOVA	Analysis of Variance
B2B	Business-to-Business
B2C	Business-to-Consumer
C2C	Consumer-to-Consumer
CFA	Confirmatory Factor Analysis
COC	Chamber of Commerce
CT	Contracting Theory
DOI	Diffusion of Innovation
DOS	Department of Statistics – Jordan
DSD	Direct Store Delivery
EC	Electronic Commerce
EDI	Electronic Data Interchange
EFA	Exploratory Factor Analysis
EG	Electronic Government
EIDF	Export and Imports Development Foundations
EJADA	European Jordanian Action for the Development of Enterprises
EM	Electronic Marketplace
ERP	Enterprise Resource Planning
ES	Electronic Signature
ETD	Exports and Trade Developments

EU	European Union
G2B	Government-to-Business
G2C	Government-to-Customer (Citizen)
GDP	Gross Domestic Products
I-EDI	Internet Electronic Data Interchange
ICT	Information and Communication Technology
INTJ	Information Technology Association in Jordan
IOS	Inter-Organizational Systems
IP	Internet Provider
IS	Information Systems
ISP	Internet Service Provider
IT	Information Technology
I-VAN	Internet Value Added Network
JCC	Jordanian Chamber of Commerce
JCS	Jordan Computer Society
JETL	Jordan Electronic Transactions Law
JT	Jordan Telecom
JTC	Jordan Telecommunication Company
MIT	Ministry of Industry and Trade – Jordan
ML	Maximum Likelihood
MOICT	Ministry of Information and Communication Technologies
NAFES	National Fund for Enterprise Support
NIC	National Information Center – Jordan
OTE	Organizational, Technological and Environmental Context
PBP	Procurement Business Process
RA	Relative Advantage
RSS	Royal Scientific Society – Jordan
SBA	Small Business Administration
SBS	Small Business Service
SCM	Supply Chain Management
SEM	Structural Equation Model
SMEs	Small Medium Enterprises
TAM	Technology Acceptance Model
TCP	Transmission Control Protocol
TCT	Transaction Cost Theory
TP	Trading Partner

TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TRC	Telecommunication Regularity Commission – Jordan
UNCITRAL	United Nations Commission and International Trade Law
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VAN	Value Added Network
VCT	Value Chain Theory
VPS	Virtual Private Server

PUBLICATIONS

1- Publications from this Research

1. Al-Bakri, A., Cater-Steel, A., & Soar, J. (2010). The Influence of B2B e-Commerce on SME's Performance and Efficiency: A review of the Literature. *International Journal of Liability and Scientific Enquiry (IJLSE)*, vol. 3 no. 3, pp. 213-224.
2. Al-Bakri, A., & Kisswani, N. (2010). Ethics and E-Commerce Systems: Cybercrime and the Need for Information Sharing Security, paper presented at the *International Arab Conference of e-Technology (IACe-T'2010)* 30 - 31 March 2010 Arab Open University – Kuwait www.aou.edu.jo

2- Other Publications

1. Kisswani, N., and Al-Bakri, A. (2010). Regulating the Use of Electronic Signatures Given the Changing Face of Contracts. *Macquarie Journal of Business Law (MqJBL)*, vol. 7, pp 53 – 65.
2. Kisswani, N., and Al-Bakri, A. (2010). Application of Electronic Signature in Business and Its Influence on Electronic Commerce Implementation. *International Journal of Liability and Scientific Enquiry (IJLSE)*, vol. 3, no. 4, pp. 282-290.
3. Kisswani, N., and Al-Bakri, A. (2010). Security, Ethics and Electronic Commerce (EC) Systems; Cybercrime and the Need for Information Sharing Security. *International Journal of Liability and Scientific Enquiry (IJLSE)*, vol. 3, no. 3, pp. 225 -237.

4. Al-Bakri, A. (2010). *I-EDI Adoption by Jordanian SMEs: Drivers, Benefits and Barriers of I-EDI Adoption by SMEs in Jordan*. ISBN: 978-3-639-22666-9. VDM Verlag Dr.Muller Aktiengesellschaft & Co. KG. Germany.

CHAPTER ONE

INTRODUCTION

1.1 Background of this Research

Business-to-Business (B2B) systems provide the gateway for an enterprise's employees, managers, customers (clients) and all of its trusted trading partners (TPs) (suppliers and retailers) to access electronic data applications and all of the necessary information they need (Akoh 2001). Therefore, the growth of B2B system adoption and capability has become a requirement for effectively servicing the businesses of many large and Small-to-Medium enterprises (SMEs) around the world (Kartiwi & MacGregor, 2007). B2B systems can be defined from several perspectives (Turban *et al.*, 2004). First, from a communication perspective, B2B systems provide the technology to enable the delivery of goods, services, information, or payments via computer networks or by any other electronic means. Second, from enterprise's functions and activities perspective, B2B systems includes enterprise processes such as buying, selling, transferring or exchanging products, services and/or information electronically by completing functions, activities and procedures over electronic networks. Third, from a commercial perspective, B2B systems provide the capability of buying and selling products, services and information on the Internet and via other online services. Lastly, from a service perspective, B2B systems are tools needed by governments, enterprises and TPs to cut the cost of services while improving the quality of TPs' services (Turban *et al.*, 2004).

This research explores internal and external organisational factors that contribute to B2B system adoption in SMEs in the industrial and services sectors in Amman (capital city of Jordan) and the influence of the adoption of these systems on their performance and efficiency. The specific internal organisational factors included in this research are (i) SMEs' strategic in practicing B2B systems, and (ii) the perceptions and experiences of SME managers in the adoption of B2B systems. At the same time, external factors included in this research are (i) the readiness of local and global TPs to adopt B2B systems, and (ii) the external pressure applied by local and global TPs who adopt B2B systems, including the infrastructure, network availability and online transactions.

In relation to the extent of B2B system adoption within SMEs, there are different methodologies that have been used to measure the B2B system adoption by SMEs. For consistency, in this current research, the author has identified the importance of various factors to measure the extent of B2B system adoption, such as the frequency of e-transactions and the extent of practicing B2B systems with local and global TPs. Previous studies such as Sahawneh (2005), Davies (2003) and Gulati (2000) have shown that the adoption of Information Technology (IT) has caused significant effects on enterprises, specifically concerning profitability, performance and efficiency. In addition, Gulati (2000) noted in his study that adoption of B2B systems by enterprises improves the efficiency of processes, reduces the cost of products, improves information, reduces rogue purchases, streamlines the supply chain and improves services.

Definitions of performance have ranged from general to specific and from quantitative to qualitative. Qualitative descriptions tend to be used for functions and

activities that are complex and comprehensive such as those at managerial levels and relationships with TPs. Quantitative descriptions are used frequently to describe procedures for which TPs' interactions can be considered (Sahawneh 2005; Devaraj & Kohli, 2003). In this current research, perceptions of SME managers of four indicators: specifically: productivity, profits, sales and costs, are used to measure the performance before and after the adoption of B2B systems.

Efficiency could be examined in terms of how the enterprises minimise the input to give a certain level of output (Bendoly & Schoenherr, 2005). Some researchers such as Banker et al. (2007), Sahawneh (2005) and Davies (2003) have concentrated their efforts on defining efficiency in terms of outcomes. This research investigates the perceptions of SME managers in Amman of efficiency measures, such as operation efficiency, procurement business process (PBP) and inventory management and control in relation to B2B system adoption and influence on SME efficiency before and after the adoption.

This research is concerned with SMEs because the majority of enterprises in Jordan, and especially within its capital, Amman, are small. In Jordan, the Department of Statistics (DOS) (2007) classifies an enterprise with less than five employees as a small enterprise, while those with 5 to 19 employees are classified as medium enterprises (DOS 2007). The economic sectors in Jordan are categorised into five main sectors: industrial, services, trade, agriculture and construction. The current research focuses on the industrial and services sectors because the majority of SMEs in Jordan, and particularly in Amman, are regarded as industrial or services enterprises (Ministry of Industry and Trade {MIT} 2008).

The industrial sector in Jordan includes manufacturing, chemicals, plastics, IT, furniture, food, packaging and engineering industries. This sector contributes to about 18 per cent of Jordanian Gross Domestic Product (GDP). The services sector includes transportation, education, health, telecommunications, and hotels and restaurants. This sector contributes 17 percent of GDP (MIT 2008). Eighty per cent of the total number of enterprises in all sectors of the Jordanian economy are small and medium enterprises and most of them are located in the capital city of Amman. In Jordan, 89.7 percent of workers in SMEs in Amman are employed in either the industrial or services sector (MIT 2008; DOS 2009a). According to the DOS in 2009 (2009a) the total number of small enterprises in industrial and services sectors in Jordan was 135,585. Of these, 94,909 enterprises belonged to the service sector, while 40,676 enterprises were described as being within the industrial sector. At the same time, the total number of medium enterprises in industrial and services sectors in Jordan is 6,780, comprising 2,550 service-based enterprises and 4,230 industrial enterprises (DOS 2009a).

1.2 Objectives of this Research

The main goal of this study is to explore the perceptions of SME managers in Amman regarding the adoption of B2B systems and its effects on SMEs' performance and efficiency improvements. This aim will be achieved through:

1. Identifying and describing the current state of use, adoption and implementation of B2B systems by selected SMEs in Amman.

2. Identifying the factors which encourage or limit the adoption of B2B systems in SMEs in Amman; and
3. Discussing and determining performance and efficiency concepts and influential factors that relate to B2B system adoption within SMEs in Amman.

In addition, this current study aims to establish whether the following relationships exist:

- Adoption of B2B systems and managers' perceptions of improved performance in SMEs in Amman; and
- Adoption of B2B systems and managers' perceptions of improved efficiency in SMEs in Amman.

1.3 Research Questions

The research questions are as follows:

1. What are the perceptions and experience of SME managers in Amman of information and communication technology (ICT) and business-to-business (B2B) systems?
2. What is the readiness of local and global trading partners and SMEs in Amman to adopt business-to-business (B2B) systems?
3. Are SMEs in Amman pressured to adopt B2B systems by local and global trading partners who adopt B2B systems?

4. Do SME managers in Amman perceive that performance has improved since adopting B2B systems?
5. Do SME managers in Amman perceive that efficiency has improved since adopting B2B systems?

1.4 Importance and Contribution of this Research

Today, more than ever before, the performance and efficiency of enterprises, specifically SMEs, is dependent upon access to accurate and up-to-date information, especially data flows between enterprises and their TPs. B2B systems use state-of-the-art tools for automating and streamlining the flow of transactions between counterparts: for example letters, documents, enquiries, payments and delivery notes to name a few. Therefore, it is important for SME managers to understand how B2B system activities affect the performance and efficiency of the enterprise. Moreover, B2B systems transfer information and data between computer systems and enable counterparts to integrate their functions, activities and procedures with unprecedented accuracy and speed. This evidence suggests that adoption of B2B systems may have a great impact on enterprise performance and efficiency. Hence, this research will:

- Contribute to a better understanding of B2B systems between SMEs and their TPs in Amman; this, in turn, could lead to improvements of performance and efficiency.
- Explain how IT and IS applications such as B2B systems have allowed SMEs in Amman to use and adopt this technology; which could, in turn lead the enterprises to provide their TPs quality services and save time and money.

This research is important because in order to improve performance and efficiency of their enterprises, SME managers need to know if B2B systems are worth adopting. This may explain why some enterprises obtain benefits of B2B system adoption, while others do not. Another contribution to the literature is that this research empirically investigates the moderating factors, including the effect of B2B system adoption in SMEs in Amman on performance and efficiency, which has not been simultaneously tested in the same model in previous research.

1.5 Outline of this Research

The remainder of this thesis is organised and presented as follows.

Chapter Two, an overview of ICT in Jordan, provides a background of IT and IS applications such as B2B systems, Electronic Government (EG) applications and Internet Electronic Data Interchange (I-EDI) in Jordan. This chapter also includes concerns of B2B system adoption in Jordanian SMEs and explores the advantages and disadvantages of B2B system adoption in Jordan.

Chapter Three, the literature review, provides a review of the existing literature on B2B systems. It also examines the findings of other researchers and authors who have extensive experience in B2B system adoption. It includes B2B systems definitions, processes, forms and classifications. Many studies that exist explore the adoption of B2B systems however few have addressed the adoption of B2B systems in SMEs and its influence on their performance and efficiency measures.

This Chapter provides a review of how B2B system adoption has been measured and how well it has performed. The literature on enterprise performance measures such as productivity, sales, profitability and costs; and enterprise efficiency measures such as operation efficiency, inventory management and control and procurement business process (PBP) are reviewed with suggestions on how these measures may be improved through B2B system adoption. This Chapter concludes with a discussion of possible moderating factors and a summary of the findings from the review of the literature that are relevant to the research questions.

Chapter Four presents and describes the current research methodology and the structural and measurement model, as well as the research hypotheses, which will be used to test them. This Chapter discusses the stages of research, the approach taken and methods of data collection and screening. This Chapter also describes the testing and administration of the interview and questionnaire as well as the statistical methods used to develop factors and measurement variables and to examine the relationships between constructs. It concludes with a discussion of the response rate and the pre-testing and analysis of research results.

Chapter Five presents the results and analysis of the collected empirical data from the interviews that have been conducted within SMEs in Amman in both industrial and services sectors.

Chapter Six presents the results and analysis of the data collected from the survey that was conducted with SMEs in both industrial and services sectors in Amman. It compares the population data to the sample data in order to ensure the findings are representative.

Chapter Seven discusses the results presented in chapters five and six. It also discusses the results of the Confirmatory Factor Analysis (CFA) measurement model and Structural Equation Models (SEM) as well as the metrics used to evaluate their reliability. The Chapter ends with tests of the hypotheses, provides answers to research questions, and evaluates how well the measurement research model explained the factors.

Chapter Eight provides conclusions and recommendations based on the literature review and empirical statistical analysis of interviews and survey data. It provides the conclusions and recommendations from the results of CFA and SEM analyses. It concludes with a discussion of implications for practicing SME managers, limitations and potential extensions of this research.

CHAPTER TWO

AN OVERVIEW OF INFORMATION AND COMMUNICATION

TECHNOLOGY (ICT) IN JORDAN

Sources: (DOS 2008)



2.1 Introduction

As this research is focusing on business-to-business electronic commerce (B2B) system adoption in SMEs in Amman, it is appropriate to provide a background of information and communication technology (ICT) and information systems (IS) in Jordan. The following briefly sets out the governmental, educational and business uses of IT and IS in Jordan, and is followed by a more specific examination of ICT adoption by SMEs. The great development is that ICT brings benefits to enterprises and their TPs; however, these benefits require planning, knowledge and deep understanding. Additionally, this technology comes with a lot of barriers that need to be overcome, such as security, infrastructure, and legal issues to name a few (DOS 2009b). Therefore, it is important to investigate and analyse the totality of the benefits of ICT adoption, which will definitely affect the marketing behavior of enterprises and their TPs in the near future. UNCTAD (2002) stated that enterprises in developing countries that are, or plan to be, involved in international trade need to start incorporating ICT and the Internet into their business models in order to stay competitive.

The Jordanian Ministry of Information and Communication Technologies (MOICT) (2008) defines 'ICT readiness' as the degree of preparation of a nation or community to participate in and benefit from ICT development. In addition, the Economist Intelligence Unit (2006) reported that Jordan was ranked 54th worldwide (out of 68 entries) according to the IT and IS readiness rankings. This indicates that many conditions are suitable to conduct B2B systems initiatives by Jordanian enterprises, although improvements and research are needed to support an environment more conducive to electronic commerce in Jordan.

2.2 IT and IS in Jordan

Many studies such as Sahawneh (2005), Titi (2005) and Gulati (2000) show that ICT was widely used in education and training development in Jordan. Recently, the Microsoft Corporation agreed to provide training courses to IT students at the Yarmouk University (a public university in Jordan). At the same time, the Jordanian government has realised the importance of education in developing IT and IS fields and mandated fundamental reforms to introduce computer-based education in public and private schools (Abu-Samaha & Abdelsamad, 2007). The Government of Jordan has taken forceful measures towards adopting IT and IS applications and Internet awareness. It has agreed on directions to make computer education a principal component in primary schools (UNCTAD 2002; DOS 2009b). In response to these initiatives, many IT and IS enterprises have been established in Jordan as noted by MOICT (2008). The following briefly describes the main IT and IS enterprises in Jordan:

(1) National Information Centre (NIC) is one of the centres of the higher council of science and technology, established to take the responsibility of developing and managing a national information system in Jordan.

(2) Royal Scientific Society (RSS) is a non-profit institution. It aims to conduct scientific and technological research and development work related to the development process in Jordan with special attention to industrial and services research.

(3) Jordan Computer Society (JCS) is the first institution in Jordan taking care of the computer business in Jordan. The JCS is a professional, scientific and social society that concerns itself with the affairs of individuals and companies operating in all IT and IS

related lines of works, and activities to improve the level of professionalism in the IT and IS fields through the society's committees.

(4) Information Technology Association-Jordan (Int@j) is a recent voluntary non-profit IT and private enterprise in Jordan. The mission of Int@j is to effectively represent, promote and advance the Jordanian software, IT and IS services industry in the local and global markets.

(5) Jordan Telecommunication Company (JTC) is a telecommunications provider in Jordan. The services from JTC aim to meet the needs of customers, generate viable returns for business, secure a competitive position, and meet the license obligations to support the Jordanian economic and social development. Full automation and computerisation of all activities and operations, especially with regard to customer care and service centres are some of the developments that have been implemented.

(6) Telecommunication Regulatory Commission (TRC) is a regulatory agency exercising over telecommunications services in Jordan. TRC aims to realise an effective working relationship among the cities, consumers, service providers and equipment suppliers to facilitate the growth of high-quality, cost-effective and reliable telecommunications services in Jordan.

Internet and communication service providers in Jordan are divided into two major areas: the larger global operator-backed Internet Service providers (ISPs) and the smaller ISPs. The global operators allow the smaller ISPs to offer a number of global services such as Global Frame Relay. However, in a market that is struggling to expand, due to a limited corporate market size, as well as the larger problem of unaffordable personal computers (PC), ISPs are finding it difficult to penetrate into what could be a

potentially profitable market (Al-Ibraheem & Tahat, 2006). Some ISPs, such as Batelco-Jordan and LINK dot NET have started bundling PCs with Internet access to solve this problem (MOICT 2008). Consequently, ISPs tend to inflate their reported subscriber figures in an effort to best position and market themselves as the most popular and successful ISP to potential subscribers. However, despite many efforts to inflate their figures, it would be fair to state that the actual number of Internet subscribers is still low and that Internet cafés will continue to flourish as long as the cost of personal computers (PC) remains unaffordable by Jordanian standards. Nevertheless, a number of Jordanian governmental bodies have repeatedly attempted to impose strict regulations on the operations of Internet cafés, blocking content, requiring identifications for users, and a number of other rules that form obstacles to increased penetration rates. MOICT (2008) illustrated that in 2001 Jordan Telecom (JT) began providing the backbone, or physical connection, for Asynchronous Digital Subscriber Line (ADSL), while ISPs may provide the Internet access end of the service to users. This arrangement has not been viewed well by local ISPs, which ISPs claim has been quite unsuccessful due to the backbone exclusivity of the service by Jordan Telecom. The potential ADSL customers such as individual and enterprises must first go through Jordan Telecom to obtain physical access to ADSL before looking for suitable ISPs to provide Internet access. In addition to the problems of dealing with two parties, the customer is then charged both by JT and the ISP, making what ISPs view as an unfriendly and complicated uptake of the ADSL service (DOS 2008).

Despite Jordan enjoying a liberalised Internet and data provision market, which is currently served by eleven ISPs, it is clearly still facing a number of obstacles that are

impeding potential growth. ISP consolidation will evolve in an industry where volume and scale are very important. Many studies in Jordan expect that the consolidation trend will continue in Jordan, bringing the number of ISPs down to seven by 2009 (DOS 2009b). Jordan Telecom (JT) provides ADSL services to 31 areas in Jordan. In addition, Jordan Telecom (JT), reports that it has an average of 150 new connections per month and the operator reports that early in 2008 it reached a target of 7,000 ADSL subscribers. The service is mainly provided to citizens and enterprises with 60 percent of subscribers being businesses. In addition, under a government initiative to provide nationwide connectivity to Jordanian students, a project headed by the Ministry of Education has extended ADSL to 450 schools across the country (DOS 2008). The IT sector in Jordan has emerged as a strong economic player since 1995. IT is responsible for the direct growth in value-added economic outputs that have considerable effect on the growth of the national economy, such as education, public administration, business service entities and manufacturing industries (MIT 2008). In addition to computer software and hardware, Jordan's IT industry also includes the telecommunications sector. The IT sector in Jordan includes the following fields: software development; hardware and packaged software sales; communication equipment; telecommunications services; Internet services; Wireless Application Protocol (WAP); data and information transmission; management services; IT training; consulting and research. Table 2.1 provides the indicators of IT and IS penetration in Jordan.

Table 2.1
The Indicators of IT and IS in Jordan

Criterion	Number
Number of internet participants	70000
Percentage of computer owners	4%
The percentage of internet users	4.7%
Number of internet providing companies	11
The number of fixed phones	733000
The percentage of mobile users	22%
The number of companies for web design	50

Source: (DOS Jordan in Figures: Economic Indicators, 2009a)

2.2.1 ICT Initiative in Jordan

The goal behind the ICT initiative in Jordan is to develop Jordan as a regional ICT hub and a competitive exporter of ICT products and services. This initiative focuses on enhancing the complementary roles and functions of the MOICT and TRC in Jordan to accelerate E-government initiative to streamline government operations, generating new ICT opportunities and strengthening partners (MOICT 2008).

The main project or training program provided by the National Fund for Enterprise Support (NAFES) in Jordan is IT and EC applications. The Information Technology Association of Jordan (Int@j), in cooperation with Arab Advisors Group, is conducting a study on “Internet use among SME in Jordan”. The study aimed to provide decision makers, operating ISPs and investors with a detailed study and assessment of the current use of Internet and EC systems in Jordan. The Int@j provides also communication services and all new technologies adopted within Jordanian SMEs. In addition, Int@j study provides an assessment of the enterprises’ future needs and the challenges facing the adoption of EC applications such as B2B, and Internet services by Jordanian enterprises (MOICT 2008; ESCWA 2003).

Internet ADSL in Jordan

The ADSL service is a method to increase communication speed through the use of copper cable. ADSL facilitates the division of capacity into channels, with higher speed to the subscribers typically for video communication, and a channel with significantly lower speed in the other direction. Table 2.2 provides a summary of ISPs in Jordan that provide ADSL service to individuals and enterprises. It also shows the rates for this service.

Table 2.2
Internet ADSL Service Providers and Rates in Jordan

ADSL – ISPs	Enterprise				Residential			
	Monthly		Yearly		Monthly		Yearly	
	JD	US\$	JD	US\$	JD	US\$	JD	US\$
Batelco Jordan	-	-	900	1,268	56	79	600	845
Global One (Jordan)	49	69	528	744	49	69	528	744
Cyberia-Index	-	-	700	986	65	92	650	915
Link dot Net	141	199	1,356	1,910	73	103	678	955
NEXT	80	113	960	1,352	80	113	960	1,352
MEC	-	-	900	1,268	-	-	600	845

Source: (MOICT 2008)

Internet Leased Lines in Jordan

Leased lines are two interconnected fixed points connected across a private network. Leased lines are dedicated circuits that for example, the JT operator runs directly between two customer sites, providing a permanent connection at a certain speed between the two sites. A leased line with an Internet connection provides permanent access to the Internet with no interruptions or wastage of time (MOICT 2008). Currently, leased lines are the most popular method of connecting large, small and medium enterprises networks in Jordan.

Web Hosting and E-mail Server Hosting in Jordan

Web hosting is a service performed by the ISPs or a web development/hosting company, which encourages enterprises to put their enterprise web sites on computers/servers owned by the ISPs, or the web development company. In general, there are three main types of web hosting approaches in Jordan: (1) Shared Server, (2) Virtual Private Server (VPS) and (3) Dedicated Server. E-mail server hosting is also offered in Jordan whereby an ISP hosts an outside enterprise's e-mail server at its own premises and provides customer support (MOICT 2008).

2.3 Electronic Commerce (EC) Systems in Jordan

Electronic commerce (EC) systems can be divided into two levels (Sahawneh 2002):

1. The simple level of EC systems covers the promotion and advertising of products and services, and electronic distribution of goods.
2. The advanced level of EC systems includes the payment and distribution at the local and global level.

With regard to the extent of EC systems activity, it is very small in Jordan. The delay in the adoption of EC systems in Jordan resulted from the limited number of owners of computers, because of high prices compared with annual income per capita. Sahawneh (2002) in his study identified that there are some barriers: financial, legal and the lack of awareness of institutions to deal with this type of EC system. As for the experience of enterprises in Jordan in EC systems, most large enterprises are connected to the Internet to attract customers and often do not aim at sales.

The development of EC systems in SMEs requires the support of these enterprises in terms of technical and financial resources (Arab Advisor Press Room 2005). In Jordan, Amman Industry Chamber (AIC), Chamber of Commerce (COC), and the Exports and Trade Development (ETD) are considered the most important institutions in Jordan for the promotion of EC systems. These institutions noted that there must be training and an increase in the number of workers on EC systems in order to strengthen its role, as well as awareness campaigns for businesses, especially SMEs (MOICT 2008). The AIC and Export and Imports Development Foundation (EIDF) are the most effective in stimulating electronic trade to their members. The EIDF set ambitious plans to stimulate EC systems in SMEs to establish sites on the Internet. One of the most important directions of EIDF is to develop a legal framework, as well as the creation of a national body that promotes EC systems and encourages enterprises to engage in this area as well as providing technical support needed by enterprises (Al-Ibraheem & Tahat, 2006). Furthermore, the use of EC systems by international enterprises in Jordan plays a major role in raising overall awareness and the promotion of EC systems, by providing financial and technical support for private and public sectors.

EC systems have the potential to fundamentally change SMEs. For enterprises, the EC systems may allow all enterprises to easily offer innovative products and services and access to new local and global TPs (Abu-Ghazaleh 2005). At the same time, enterprises that adopt EC systems must develop different methods of conducting business, including methods that may introduce new risks and barriers to the enterprise.

For SMEs, the EC systems introduce competitive pressures that may bring significant changes. The following points present the two main adopted forms of EC systems in Jordan.

1. Business-to-Business (B2B) Systems

This is the most common form of EC systems in Jordan. B2B-EC systems run between enterprises and TPs. The report by ESCWA (2007) noted that globalisation is the strongest driver for B2B-EC systems in Jordan, since multinational corporations have increasingly been systematic in requiring their regional distributors to do business with them solely via electronic channels. In addition the Jordanian government's support is the second most important accelerator for B2B- EC system adoption in Jordan. Other B2B system drivers include the long-term cost savings usually associated with EC systems, increased collaboration with TPs and the potential for new business opportunities brought about by access to new international markets (ESCWA 2007).

2. Business-to-Consumer (B2C) Systems

The use of the B2C systems in the form of EC systems is limited in Jordan, where there are only a few enterprises with sites on the Internet and wish to sell to the consumers. Often the aim of this form is to expose the products to the consumers in Jordan. As the trend of online consumer shopping gained firm acceptance worldwide, many enterprises in Jordan established B2C-EC systems' channels to facilitate sales to their consumers through the Internet. B2C-EC systems started to gain popularity mainly among sellers of flowers, gifts, books, software and hardware (ESCWA 2007). In addition the ESCWA's report in 2007 mentioned that during the past two years, the tourism industry (service sector) has achieved tremendous growth, partly due to the presence of some world-class

airlines, hotel chains and resorts in Jordan. Hence, due to online reservations, the airline and hotel segments of the tourism industry have become the fastest growing in terms of B2C- EC systems' transactions in Jordan (ESCWA 2007). However, the lack of use of this form by consumers has resulted from uncertainty in conducting enterprise transactions through the Internet (ESCWA 2007).

2.3.1 Usage of EC Systems in SMEs in Jordan

The Internet is becoming more common in communications and transactions between enterprises and TPs. Many transactions such as inventory queries, invoices, order placement and confirmation and market research to find suppliers of products is Internet-based (Sahawneh 2005; 2002). According to Kim et al. (2006) the adoption of EC systems is expected to result in a reduction of the transaction costs that are incurred by these enterprises. Its significance lies in the fact that it is a tool used by enterprise managers to enhance productivity, as well as to increase the performance of the enterprise by creating a knowledge-based economy and improving educational outputs (Kim *et al.*, 2006). SMEs may use EC systems to collect information concerning buying and selling to provide information about products and services and to present help and support for TPs. A report by the Arab Advisors Group (2003) based on a survey (of close to five percent of Jordan's SMEs) showed a satisfactory level of adoption of EC systems by enterprises in Jordan. Nonetheless, the report also noted that Jordanian SMEs needed to have more awareness of IT adoption that could better restructure their functions and activities with TPs (Arab Advisor Press Room 2005). Recent studies in one of the northern cities in Jordan (Irbid) showed that ICT and IS such as B2B, B2C, Government-to-Business (G2B) and EC systems were a dynamic value-added aspect of

the economy and played an important role in driving major economic sectors in Jordan (Sahawneh 2005; Titi 2005). Abu-Zaid (2005) noted that because of inefficient strategies and action plans of EC systems in Jordan, only several of the functions, activities and procedures in large enterprises in relation to their local and global TPs are conducted over the Internet and are performed by managers. In 2007, it was reported that the percentage of individual Internet usage did not exceed 4.7 percent of the population in Jordan. It was also reported that there were only 11 Internet providing companies (IPs), whereas the number of companies for Web design was 50. Ownership of computers in SMEs is also low (DOS 2008).

2.3.2 Barriers of EC System Adoption in Jordan

There are many different potential barriers that could limit the adoption of EC systems, such as privacy and security issues; skills and expertise; readiness of customers and suppliers; legal and regulatory environment; infrastructure; business strategies; cost; awareness and knowledge. In addition, risks and barriers are very important in understanding the adoption behavior of SMEs. Barriers regarding organisational readiness include lack of new education methods, and lack of information and knowledge. The barriers, which limited the spread of EC system adoption in Jordan, are summarised as follows (Sahawneh 2005; Titi 2005, pp. 159-178).

1. Lack of understanding of the significance for consumers on the need to conduct transactions online.
2. There is a barrier by some companies to access confidential information about competitors.

3. Barriers related to fraud, deception and piracy.
4. Lack of coordination between sectors in Jordanian market.
5. Limited use of credit cards in international payments through the Internet.
6. Lack of sufficient awareness of the institutions and individuals of e-commerce and the lack of training and education regarding EC systems.
7. Mistrust of electronic payment operations, where there is a belief that the electronic payment may be prone to deception, fraud and unsafe and that there is a lack of a framework and legal protection.
8. Lack of funding for projects relating to EC systems.
9. Absence of an electronic directory of EC systems.
10. The lack of formalised norms and standards for EC systems.
11. No detailed studies exist that identify the behavior of the business community as it relates to the use of the information network and international transactions electronically.
12. Lack of preparedness of banks in Jordan to conduct financial transactions online.
13. Cultural barriers hinder the spread of EC systems, in particular the cultural preference for Jordanian people to conduct business and personal finance transactions personally.
14. Lack of a clear strategy and comprehensive EC systems in Jordan.

2.4 Electronic Government (EG) in Jordan

Governments in leading countries such as USA, UK, Australia, France and Canada are adopting EG as a means of promoting economic and social development, enhancing the effectiveness and efficiency of government operations, and improving their services to businesses (Caldow 1999). EG in Jordan represents an opportunity to make a major contribution to economic development and to enhance the performance of enterprises through assisting Jordanian SMEs to reduce their operating costs in dealing with government units and by providing immediate access to government information and data that will assist their business development (MOICT 2008; DOS 2008). Some view EG primarily as a technology exercise, integrating individual databases and websites of government departments (MOICT 2008). Others view it as a means of bringing the government closer to common businesses and citizens (MOICT 2008). However, some view EG primarily as EC and government-to-business (G2B) or/and (B2G) systems, facilitating government procurement on-line. Therefore, there is no common definition of EG, even if the term is widely used. Caldow (1999) in her study asserted that the reality is that EG includes most of these aspects and has multiple dimensions. Caldow (1999) added that the objectives of an EG program vary from country to country, reflecting cultures, priorities, government structures and technology endowment. Table 2.3 demonstrated the objectives of various governments that currently deliver electronic services.

Table 2.3
Various Objectives for Electronic Government (EG)

Country	Primary Objectives
Dubai	Reinvent government by enhancing the quality, convenience, accessibility and speed of government services
Singapore	Enhance citizen services Stimulate IT capacity development
UK	Enhancing services to citizen and businesses
Qatar	Enhance economic development
Jordan	Improvement of economic development and competitiveness Encourage Jordanian enterprises to adopt and practice e-commerce and Internet activities.

Sources: (MOIC 2008; DOS 2009; OECD 2003).

Numerous studies such as the UN study by General Assembly Economic and Social Council (2000), and OECD (2003; 1999) have shown that EG can provide a variety of benefits to enterprises, TPs, suppliers, economic partners and other government institutions and departments. These can provide significant cost savings and lower transaction costs for more enterprises in the same sector. DOS (2008) in their e-Government report illustrate that the positive impact of EG and ICT adoption in enterprises in Jordan has been well documented. In addition, according to the MOICT (2008) the cost savings from Internet and other ICTs have been significant for electronically delivered products such as financial services, travel and software. Indeed, there is increasing evidence of the cost impact of EG proposals, even if this is less well documented (Coppel 2000). Table 2.4 shows the cost impact of adopting EG initiatives in the various global sectors.

Table 2.4

Cost Impact of E-Government Initiatives in the Global Various Sectors

Sector	Percentage of Cost Impact (Savings)
Airline Industry	87%
Banking Industry	89%
Electronic Bill Payment	67%
Life Insurance Industry	50%
Software Industry	99%

Source: (DOS 2008; OECD 2003)

Hence, this cost impact of EG in Jordan is in keeping with the Jordanian government's vision of transforming Jordan into a knowledge-based economy and streamlining government to improve public services and enhance performance of enterprises within different sectors. In addition, currently, a number of ongoing initiatives exist to achieve the objectives of the Jordanian EG vision. Further, DOS (2008) reported that development and successful implementation of an EG strategy is inextricably linked with the implementation of these and related proposals, such as: REACH Initiative, National Economic Forum and Public Sector Reform. The REACH Initiative is a comprehensive strategy to develop an internationally competitive IT and IS industry in Jordan. The National Economic Forum is aimed at stimulating economic growth and enhancing enterprise performance and efficiency through reforms of economic, IT, and IS applications in Jordan. Public Sector Reform refers to a study that recommended actions to improve openness and accountability, and IT utilisation to enable much needed modernisation of the public and private enterprises (MOICT 2008). On the other hand, DOS (2008) reported that Jordan faces a number of challenges in initiating an EG project, these include the following:

1. Low level of Internet penetration. This is a significant barrier to the introduction of EG, EC systems and ICT.
2. Infrastructure constraints. This includes the high cost of telecommunications services and lack of an adequate network nationwide.
3. Privacy security concerns.
4. Limited IT skills: there is a fundamental lack of computer literacy in Jordan that limits the participation of enterprises and government institutions in e-government.
5. Lack of awareness: the business sectors currently have a very limited idea about what e-Government is and how to benefit from it.

In Jordan, enterprises are not yet optimising the Internet, with few large enterprises who can be considered as doing business online. This might be because of some obstacles in the EC system adoption, and limited awareness among individuals and enterprises (Titi 2005). Titi (2005) also noted that electronic transactions law was passed in March 2002, giving electronic documents an official seal, and they are now considered as eligible physical documents in the court of law. Moreover, E-transactions laws in Jordan allow for the following: sharing of information electronically across government departments, acknowledging electronic messages, contracts and records as legal documents, online payments for government services, recognising electronic signatures and recognising a certification authority for authentication. In addition, based on United Nations Commission and International Trade Model Law (UNCITRAL), Jordan's Electronic Transactions Law (JETL) recognises the equivalency of electronic signatures, exchange documents, data, and transactions as having the same the legal

status as original versions (MOICT, 2008). The law grants the Central Bank of Jordan the authority to regulate the electronic transfer and exchange of funds and also sets penalties for any crime committed through electronic means. Therefore, the critical next step in implementing this law is to establish the infrastructure and institutions necessary for certifying and processing transactions.

2.5 Internet Electronic Data Interchange (I-EDI) in Jordan

IT is considered one of the greatest developments in the world of business. IT and IS applications such as EC, B2B, B2C, G2B systems and Internet electronic data interchange (I-EDI) systems are so exciting that many enterprises in the world could be affected. I-EDI systems are an important component of B2B e-commerce systems. Hence, the adoption of I-EDI systems is likely to allow enterprises to become more integrated into the world economy. The degree of effectiveness of the I-EDI systems operation itself, as well as the internal management information available from its use, will certainly be greater if application systems are up-to-date and efficient such as B2B systems. SMEs in Jordan are still facing many challenges in terms of using I-EDI systems in their businesses. Many of these challenges include the lack of experience to deal with such technology, or the fear of the security breaches were provided by I-EDI systems. Many previous studies such as Thong (2001; 1999) and Ramamurthy et al. (1999) suggest that I-EDI system adoption can lead to efficiency gains through reduced time to complete transactions and lower services costs. Effective gains can accrue through better service quality and increased sales as a result of better and wider marketing of products. Therefore, if I-EDI systems are to play an integral part in the

Jordanian sectors and development strategies, Jordanian enterprises need to understand access and use this technology so that benefits are maximised and disadvantages are minimised (ESCWA 2003). Hence, the emphasis must be on B2B trading where opportunities for involvement in the global supply chains via strategic alliances or partnerships with local and global enterprises in worldwide can be seized.

The level of IS and IT sophistication and organisational readiness has often been identified as a predictor of successful I-EDI system adoption. Top management support, competitor's pressure, knowledge and Just-By-Chance (JBC) factors are the main reason why most large enterprises in Jordan get acquainted with I-EDI systems. Knowledge about this type of new technology and business between TPs locally, or internationally, is still generally lacking (Al-Bakri 2007). In a prior study, Al-Bakri (2007) found that Jordanian SMEs embrace I-EDI systems mainly because of Just-By-Chance. This contrasts with findings from other studies in developed countries such as Premkumar et al. (1995), Ramamurthy et al. (1999) and Venkatesh et al. (2003) about the impact of I-EDI systems on enterprise in developed countries. The literature shows that Jordan, as a developing country, has achieved forward steps in introducing the Internet to the different sectors of life. The adoption of the electronic tools in business became a governmental target in recent years to make it possible for SMEs to be able to continue to achieve success in their business (Al-Bakri 2007). Most of Jordanian SMEs have little or no competitive pressure to use I-EDI systems, since most suppliers, customers and other competitors do not seem to promote I-EDI systems.

2.6 Business-to-Business (B2B) Systems in Jordan

The world is experiencing an information knowledge revolution that is fundamentally transforming the way in which SMEs operate and interact. Graham and Hardaker (2000) have found that a critical development in the communication between enterprises is taking place, which is actually redefining enterprises and commercial transactions with TPs. Advances in ICTs, especially B2B system adoption, may have sharply driven down enterprises' operating costs and were allowing SMEs in Jordan to compete on an even footing with large Jordanian enterprises (ESCWA 2007). B2B systems include steps in the enterprise's internal activities that are supported and changed by using computer networks in an innovative way (Hales et al., 2002). In addition, the popularity of the Internet and the variety of EC systems applications assist the development of B2B systems bringing together TPs and SMEs and leveraging the networks technologies to smooth logistical co-ordination across the networks (Warren & Hutchinson, 2000). Therefore, B2B systems provide direct and indirect links between SMEs and TPs and support their business transactions, processes and information sharing. This section aims to recommend an integration of B2B systems practices in SMEs in Jordan. The process is based on the improvement of electronic marketplace (EM) in Jordan. The EM can be operated with two basic methods, either as global or closed marketplace. In the global marketplace anyone can trade without major limitations (DOS 2008). Nevertheless, it is recommended that a closed marketplace is better for SMEs, because the access is limited. To achieve successful B2B systems practice by SMEs in Jordan, the most important aspects and factors that have to be taken into consideration have previously been cited by previous researchers as follows (Phan 2001; Raisch 2001):

1. Support from top management;
2. Appropriate management of TP's expectations;
3. Information technology systems' infrastructure;
4. Internet sites of high quality; and
5. Competitive advantage maintained in operational efficiency.

A number of large enterprises in Jordan engage in activities such as selling, buying and exchanging information with their trading partners and suppliers online (Abu-Samaha & Abdelsamad, 2007). On the other hand small enterprises are not yet optimising ICT because of obstacles such as lack of knowledge, limited awareness of SME managers in relation to EC system adoption, and low level of Internet penetration in business (Titi 2005). However, the MOICT (2008) in Jordan noted that Jordan was ranked sixth in the Middle East and Africa in relation to ICT infrastructure, connectivity, e-leadership, information security and e-business (MOICT 2008; Abu-Ghazaleh 2005). In addition, according to the ESCWA (2007) in Jordan there is rapid progress in ICT education, computerisation and e-Government contributing to an increased spread of IT knowledge centres for SMEs. Jordan is currently witnessing a rapid shift into the use of online transactions especially in the SME sector (ESCWA 2007). Therefore, the current research tests the extent of B2B system adoption in SMEs in Amman and the perceptions of its influence on performance and efficiency. MOICT (2008) expects the Jordanian Internet market to grow at a rate of 10 per cent of subscribers per year by the end of 2010. On the other hand, a survey conducted in 2004 to study the level of technology available in SMEs in Irbid, an industrial city in Jordan, showed that about 26

percent (of a total sample size of 110) did not have any computers in their enterprises, 33 percent of SMEs have two computers, while 8 percent have three computers at their enterprises and 18 percent of enterprises have four-to-thirty four computers (Titi 2005). As at the end of 2009, Abu-Ghazaleh (2005) estimated the number of Internet users in Jordan at 222,108 users. In addition, Titi in his study in 2005 listed SMEs priorities for using the Internet. The priorities in decreasing order of importance are: e-mail integration; reduction of cost; to contact TPs; to improve coordination with TPs; entering new businesses and markets; expanding markets for existing products and services; finding suitable infrastructure and technology; high competence and good customer relations. Hence, Al-Ibraheem and Tahat (2006) noted in their study that the B2B system adoption in Jordan should have different supported instruments to encourage enterprises and their TPs to do business and transactions online with confidence.

2.6.1 Advantages of B2B System Adoption

B2B systems have evolved through various stages of technological development. The growth of the B2B systems is changing the way of both small and medium-sized enterprises interact with their TPs (Thatcher & Foster, 2002). As SMEs environments in Jordan become more complex and competitive, the need for tools to assist B2B systems transactions are increased. Further, after the spread of EC systems adoption in various-sized enterprises, B2B systems become more and more important in each enterprise's processes, and are increasingly treated as a framework of enterprise strategy (Fraser 2000; Heffes 2001). On the other hand, one of the main challenges faced by SMEs in Jordan in the recent years concerns the adoption of B2B systems

with Web-based technologies. In addition, new skills and processes in SMEs in Jordan require employees to learn new things (Al-Ibraheem & Tahat, 2006).

Across the world, many enterprises are moving or have already moved their main operations to Internet-based and EC systems, to take advantage of the potential of more automation, efficient business processes, and global visibility (Leopoulos et al., 2005). However, current research asserts that one of the major obstacles faced by SMEs for B2B system adoption is simple lack of experience and knowledge (Al-Ibraheem & Tahat, 2006). However, B2B systems also provide a channel to develop new products and services for both existing and new TPs (Heffes 2001). In addition, in the present highly competitive global and local environment, SMEs must consider an open, useful, dynamic information system and make planned modifications that are in keeping with the demands of their environment. The possible advantages of B2B systems' adoption include online integration with information systems of business TPs, which could lead to modified products and services; a better understanding of suppliers' needs; a more expanded worldwide market; cost-efficient production; and, accurate real-time information exchange. In addition, Skjoett-Larson (2000), and Skjoett-Larson et al. (2003) assert in their studies that B2B systems can be used as a fast and efficient means of communication between enterprises and TPs, order confirmation and invoicing. They also added it can be used for planning information, for example, sales forecasts, up to-date sales figures, and inventory levels and control. Hence, maybe one of the principal advantages of adopting B2B systems by SMEs is to achieve efficiency in communicating the needs of the SMEs' production and distribution lines to the TPs at the same sector. However, to date, B2B system

adoption in Amman has been mainly implemented by large enterprises in the supply chain rather than by SMEs. Hence, this justifies this study's assertion that SMEs in Amman should be involved in the aforementioned B2B systems and in either global or closed electronic marketplaces (EM) (Abu-Ghazaleh 2005). Leopoulos et al. (2005) provide an explanation of the advantages for each participant of the B2B systems in EM:

- a) First participant: SMEs. Adoption of B2B systems and EM can decrease costs, increase inventory efficiency and improve the overall performance of the manufacturing and procurement processes. It also reduces direct and indirect supply chain costs, and can provide opportunities by enabling commerce with qualified new suppliers that were unknown before and may be more price-competitive.
- b) Second participant: TPs (retailers). B2B system adoption offers them a great range of suppliers and enterprises in the same sector in both local and global markets, better quality of products and services, improved and fast information flow, as well as reduced cost for the transactions and less time spent in finding the right suppliers or buyers.
- c) Third participant: Suppliers. They can access new enterprises as customers through B2B systems, and present their products while significantly reducing the promotional and advertising costs. Suppliers also can benefit from B2B system adoption through EM, by increasing their marketing models by creating databases with preferences of their customers and partners and statistical data from the EM operator.

d) The last participant: EM operator. The EM operator can gain substantial rewards by sharing the returns achieved by suppliers and buyers such as SMEs and TPs and increase their income by selling web space in the enterprises to advertise. EM operator also may achieve earnings calculated as a percentage of the decrease in cost that they achieve for SMEs.

2.6.2 Disadvantages of B2B System Adoption

MOICT (2008), Al-Ibraheem and Tahat (2006), and Titi (2005) mentioned that SMEs in Jordan attempting to adopt B2B systems would face major technical and general limitations such as:

1. Difficulties with the integration of B2B systems into existing applications and databases.
2. Rapidly changing and still evolving software development tools.
3. A lack of B2B systems security, reliability, standards and communication protocols.
4. B2B systems software and applications may not fit with some hardware.
5. Lack of B2B systems transactions' trust.
6. Security and privacy issues
7. Lack of government regulations.
8. Insecurity due to rapid change of technology.
9. Expense of accessibility.
10. Inconvenient for many potential TPs.

Table 2.5 lists some of previous studies that have focused on disadvantages of B2B system adoption in enterprises.

Table 2.5
Disadvantages of B2B System Adoption in Enterprises

Disadvantage	Study
Deterioration of relations with TPs	Raymond (2001), Stauber (2000)
Higher costs	MacGregor (2004), Stauber (2000)
Increased computer maintenance	MacGregor et al. (1998)
Doubling of work	MacGregor (2004), MacGregor et al. (1998)
Reduced flexibility of work	MacGregor (2004), Lee (2001)
Security risks	Ritchie & Brindley (2001)
Dependence on B2B systems	Sparkes & Thomas (2001)
Non-B2B systems procedures having to be done through B2B systems formats	MacGregor (2004), Lawrence & Yee-Shyuan (1998)

Source: Developed for this research

2.7 Summary of Chapter

This Chapter presented a background of the extent of the ICT, IT and B2B systems in Jordan. It was mentioned that the development of the ICT in Jordan brings benefits to the enterprises and their TPs. In this Chapter the B2B systems' readiness in Jordan is defined as the degree of preparation of a nation or community to participate in and benefits from ICT development. The government in Jordan has taken forceful measures towards adoption IT and IS applications and Internet awareness. In 2007, it was reported from the DOS (2008) in Jordan that the percentage of individual Internet usage did not exceed 4.7 percent of the population in Jordan. This Chapter highlighted through subsections on the benefits and risks faced B2B system adoption in Jordan. In addition, this chapter explored the current extent of the EG in Jordan, which provides various objectives and programmes in support of EG in Jordan compared with other

developed and developing countries. Based on the recent studies and reports in Jordan, the B2B system adoption was mainly adopted by large enterprises in the supply chain rather than by SMEs.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

IT changes have caused the growth of EC systems that provide enterprises with opportunities to enhance existing business activities. In particular, the Internet has introduced many new ways of trading; allowing interaction between groups that previously could not economically afford to trade with one to another. EC systems have evolved through various stages of technological development. The growth of the EC systems is revolutionising the way that large enterprises and SMEs interact with their TPs. In the rather short history of EC systems, events have demonstrated that successful enterprises are those that recognise the needs of their target audiences and match them with relevant content. Turban et al. (2004) mentioned that the term 'EC systems' describes the process of buying, selling, transferring, or exchanging products, services and/or information via computer networks, including the Internet. EC systems have been used for B2B systems communication for almost a quarter of a century. EC systems describe technologies that provide enterprises with on time associations with their TPs and internal functional areas. Some researchers are taking a very extensive analysis of what actually represents an EC system. Gunasekaran et al. (2002) define EC systems as any type of technology (e.g., telephone calls, facsimile documents, and EDI) that enables the conduct electronically of business transactions among various entities. Other researchers such as Lucking-Reiley and Spulber (2001); Hoffman and Novak (2000) restrict EC systems to the use of computer and Internet technologies to automate

business transactions. Vickery et al. (2004) argue that it is the use of the Internet that makes EC systems unique.

Following sections in this Chapter will explain the definition of electronic commerce systems, its role in running current enterprises, the distribution of B2B systems in different countries and provide an overview of enterprise performance and efficiency. The Chapter will also focus on SMEs, as this sector is facing the greatest challenges in terms of the deployment of B2B systems, and as such it will become more challenging for them to use such systems to enlarge their businesses to achieve their market potential locally and globally.

3.2 The Importance of Electronic Commerce (EC) Systems in Business

The development of EC systems is considered to be one of the major recent innovations in international trade. The reliance of businesses on EC systems has intensified following increased availability of technology that enables e-commerce at a reasonable cost per transaction. The markets of retailing, financial services, banks, marketing malls, publishing, communication, advertisements and travel have all been impacted by EC systems. Turban et al. (2004) noted that the extent of impact was unlimited for some enterprises where the facilities used for the EC systems are all available, but it was restricted wherever the facilities were not in place, or existed to more limited extent. The nature and structure of business enterprise has been changed as a result of the EC system adoption. EC systems have both negative and positive impacts on the enterprises. The potential effect of EC systems has been dependent upon the availability of human resources capabilities in enterprises and the attitude of management to make a change.

In addition, there are many barriers that face the deployments of EC systems in different enterprises in different countries. These barriers vary from one country to another according to the level of technology distribution and the distribution of technology knowledge inside the country. Jordan, like many other developing countries, faces many barriers to deploy EC systems in enterprises. One of the EC systems models that will be studied in detail in this research is the B2B system. This model of EC systems is used widely in developed countries, while it is still restricted in the developing countries such as Jordan due to many barriers including IT and human resources.

3.3 Benefits of Electronic Commerce (EC) Systems

The wide distribution of EC systems in some parts of world, particularly in developed countries, is as a result of the anticipated and actual benefits that it can and does accomplish for both customers and enterprises. The benefits generated from EC systems cannot be evaluated or tested, other than by the customers that practice EC systems for shopping and through the enterprises that use such commerce models to distribute and expand their business activities. Therefore, the subsets of benefits that might be achievable through EC system adoption can be divided into benefits for both individuals and organisations. Turban et al. (2004) noted that the benefits generated by individuals were very wide and accomplished through many aspects of an individual customers' life. One of the major important benefits for customers is the constant availability of EC systems. Customers can log on and get through the Internet for shopping at any time through the day or the night. The other advantage introduced by EC systems for the customer is the ability to find and purchase cheaper products and services than those

available through regular commerce channels. The customer can search for the same product for a cheaper price from different locations while remaining physically static. The customer has the opportunity to run comparisons and make decisions (Turban *et al.*, 2004).

The potential benefits that can be accomplished by enterprises that use e-commerce are very wide. The major benefit for enterprises is the development of global reach (Turban *et al.*, 2004). Therefore, EC systems make it possible for the enterprise to expand its business activities locally and globally. Quayle (2002) suggested that EC system adoption leads to enhanced opportunities to increase competitiveness, to reach new partners, suppliers and markets and to develop seller/buyer relationships. In addition, EC systems improve the supply chain. This happened through minimising the supply process via the EC systems. In EC systems, the enterprise benefits constantly by enabling sales 24/7 without any extra transaction cost for the enterprise itself. Turban *et al.* (2004) noted that EC systems provide an advantage for enterprises through the rapid 'time to market' and shortened supply chains. This happens because of the improvement of communication and collaboration. EC systems will allow the enterprise to build good relations with customers through the electronic contact tools. Besides, many other benefits provided through EC systems such as the introduction of new business models, customisations and lower communications cost (Turban *et al.*, 2004; Titi 2005). On the other hand, MacGregor (2004) noted that, while many enterprises have adopted EC systems in order to gain a greater share of the global market, still many other enterprises, especially SMEs, are simply intent on improving internal performance and efficiency.

EC systems will help to use the communication technologies and apply the best tool for enterprise's functions and activities to accomplish competence and increase performance and efficiency in the local and global markets (Titi, 2005). However, Kamel and Hussein (2001) asserted in their study that shortage of skills of IT and IS have been categorised as one of the main challenges facing EC systems. This is very important in SMEs as researchers as often describe them:

“Lacking of the expertise needed to set up the necessary of technologies, despite having a great deal to gain from doing so” (OECD, 2003, p. 193).

Titi (2005) asserted that the effectiveness of using the available tools in EC systems indicated that the enterprise could potentially save time through using the most efficient method to contacting TPs. EC systems offer many opportunities to improve their performance in new method. Availability of EC systems for SMEs has many advantages as following (Greenstein & Feinman, 2000):

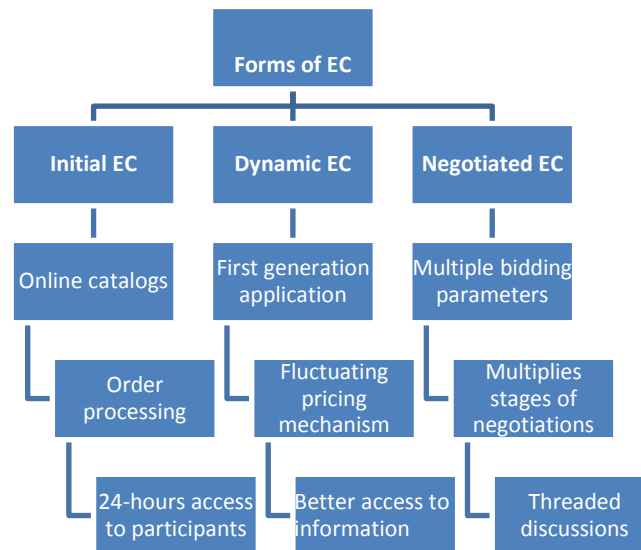
1. Increased sales and exports of SMEs to enable them to enter global markets and enable them to compete.
2. Operating EC systems lead to reduced costs, especially for costs associated with imports, and to increase export revenue.
3. EC systems enable enterprise access to information on markets and make investment opportunities much easier and more consistent.
4. EC systems are tools that can create opportunities for enterprises to communicate directly to global markets at low cost of outlay.

One of the main advantages of EC system adoption by enterprises is the reduction of costs associated with using an Internet standard rather than a traditional commercial transactions in relation to functions, activities and procedures with trading partners and suppliers (Kamel & Hussein, 2000). In EC systems, the idea is to set up a relationship between two enterprises that will make some sort of complementary functions, activities and procedures. This relationship involves the adoption of similar standards; extensive inter-enterprise communication and collaboration via compatible IT.

3.4 Process and Forms of Electronic Commerce (EC) Systems

Zwass (2003) and Leopoulos et al. (2005) asserted that the system that links enterprises through electronic means is known as EC systems. Further, EC systems cover any models of transactions, data and information sharing and exchange between enterprises (B2B-EC systems), EC systems facilitate transactions and information-sharing between enterprise and customer (B2C-EC systems), between government and enterprise (G2B-EC systems), between government and citizens (G2C-EC systems) and between customers (C2C-EC systems), which all take place using new IT such as EC systems and Internet (Leopoulos et al., 2005). Therefore, the Internet has changed the sight of how participants around the world view telecommunication, buying and selling transactions. Following Figure 3.1 classifies the main three forms of EC systems.

Figure 3.1
Forms of EC Systems



Source : (Leopoulos et al., 2005)

The first form of EC systems is Initial EC. It used the traditional fixed pricing models that met the necessity to manage the increase in both volume and diversity of products and services. Accordingly, enterprises spend a substantial amount of money on market and information technology research in order to understand and predict the developments and demand of products and services (Warren & Hutchinson, 2000).

The second form of EC systems is the Dynamic EC. Warren and Hutchinson (2000) described this form as the ability to buy and sell goods and services based on Web pages, where the price is changing depending on supply and demand. It also eliminates the need for many intermediaries and reduces the cost of transactions. In Leopoulos et al. (2005) study, it was asserted that in this form of EC system, buyers

could provide a wider variety of suppliers and better availability of information. In the mean time, sellers could translate into higher revenues and quicker inventory turnover.

The last form of EC systems was negotiated EC; this form has been described as the map complex negotiation structures in the enterprise's transactions, including multiple stages of negotiations with more than one bidding parameters, such as price and delivery time (Leopoulos et al., 2005).

3.5 Internet Electronic Data Interchange (I-EDI) Systems

The Internet Electronic Data Interchange (I-EDI) systems are defined as a direct computer-to-computer communication between enterprises and their TPs. Exchange information of business documents, data and information and structured format that permit data to be processed by the receiver without re-keying (Premkumar et al., 1997). I-EDI system is an illustration of an early adoption of computer networking (Helle 2002). I-EDI systems have become a key element of corporate strategies to create value by providing closer linkages among enterprises and TPs (Chanu 2001). I-EDI systems allow enterprise's computers to perform electronic transactions such as purchase orders and invoices without human intervention (Pavlou 2001). I-EDI systems were popular among large enterprises because it saved money that otherwise would be spent on processing paper and re-keying data. The continuously accelerated level of I-EDI system proliferation in recent years has prompted a growing number of researchers to examine some of the emerging issues surrounding the adoption, implementation, and diffusion of I-EDI systems. I-EDI systems have become a fundamental part of information management in many organisations over the world.

I-EDI systems represent a new way of thinking about an old business function. It is the belief in the ability to modernise and streamline business practices (Graham & Hardaker, 2000). The complexities of I-EDI systems are centered on the definition of the TP's relationships and the data integration with supporting business application systems. I-EDI systems also provide businesses with the ability to exchange business documents easily between trading partners without the laborious, time consuming, error prone movement and handling of paper (Graham & Hardaker, 2000).

3.5.1 Benefits of I-EDI Systems

The benefits are I-EDI systems both direct and indirect in nature. Direct benefits include operational cost savings and other internal efficiencies arising from, for example, reduced paperwork, reduced data re-entry, and reduced error rates. Likewise, indirect benefits are opportunities that emerge from the use of I-EDI systems, such as improved customer services and the potential for process reengineering (Pavlou 2001). At the same time, benefits are distinguished into operational benefits and strategic benefits. Operational benefits are related to the internal efficiency of an organisation and include reduction of transaction errors, improvement in data accuracy, decreased transaction costs, and faster application processes. Strategic benefits should contribute to tactical and competitive advantages and are related to the impact of I-EDI systems on business processes and business relationships (Chan 2001).

The following shows some of I-EDI systems benefits:

- (1) I-EDI systems improve operational performance in terms of operation efficiency, cost saving and inventory control (Wilding & Newton, 1996; Graham & Hardaker, 2000).
- (2) I-EDI systems improve performance of Supply Chain Management (SCM): Shared and exchange information between supply chains partners can only be fully leveraged through process integration. The main objective of SCM is to integrate all key business activities through the improved relationships at all levels of the supply chain including internal operation, supplier's networks and distribution channels (Wilding & Newton, 1996).
- (3) I-EDI systems help to maintain a better relationship with TPs. This improves supplier-enterprise relationships and creates a competitive advantage.

3.5.2 Practice and Strategies of I-EDI Systems

In theory, I-EDI systems allow all vendors and their customers such as TP to link their computing infrastructures without worrying about the differences in their respective enterprises and systems. However, in practice, I-EDI systems have been difficult to use efficiently or inexpensively in developing countries particularly in SMEs (Al-Bakri 2007). The core purpose of I-EDI systems in B2B systems transactions is to transport business documents via electronic means in a format that is reusable throughout the entire organisation and beyond (Helle 2002). The degree of effectiveness of the I-EDI systems operation itself, as well as the internal management information available from

its use, will certainly be greater if application systems are up-to-date and efficient. Mak and Johnston (1998) divided I-EDI system adoption strategies into three categories:

- (1) Strategies not requiring third party involvement using additional front-end software. In these strategies, data exchange is dependent on the front-end software used by TPs.
- (2) Strategies requiring third party involvement without using additional front-end software. The third party in this strategy may be a value added network (VAN) wanting to establish a web presence.
- (3) Strategies requiring third party involvement using additional front-end software. In this strategy, TPs also require additional front-end-formatting software provided by the third party (I-VANS) (Kosiur 1997).

3.5.3 I-EDI System Adoption in SMEs

Iacovou et al. (1995) found that SMEs in general tend to resist adopting I-EDI systems because of a lack of understanding, lack of technical support and limited financial resources. Many researchers of I-EDI systems such as Senn (1998), Mak and Johnston (1999) focused on the factors that make the Internet very attractive for I-EDI system adoption by SMEs:

- (1) The Internet's global Internet work connections offer the potential to reach the largest possible number of trading partners (Hraska 1995).
- (2) Flat-rate charges for Internet transmission do not depend on the amount of data transferred (Hraska1995).
- (3) I-EDI systems can complement or replace current EDI strategies (Senn 1998).

- (4) Using the Internet to exchange EDI transactions is consistent with the growing interest of business in delivering a variety of products and services electronically using the Internet (Senn 2000).
- (5) The Internet is a publicly accessible network with few geographical constraints (Hraska 1995; Senn 2000).
- (6) New and powerful tools that make it feasible to interconnect traditional business applications to the Internet with a minimum of challenge are becoming widely available (Senn 1998).
- (7) ISP provides many of the services formerly purchased at a greater cost from traditional VANs (Mak & Johnston, 1999).
- (8) The Internet provides simple and widely understood new methods for information exchange (Senn 2000; Mak & Johnston, 1999).

3.6 An overview of Electronic Signatures

An electronic signature can be defined as any letters, characters or symbols manifested by electronic or similar means and executed or adopted by a party with an intent to authenticate a writing (Blythe 2005). Scott et al. (2003) mentioned that as any method which applies a signature to an electronic message, from type name of the sender. On the other hand, the United Nation Model Law on Electronic Signature (2001) defined electronic signature generically as;

“Data in an electronic form in, affixed to or logically associated with, a data message, which may be used to identify the signatory in relation to the data

message and indicate the signatory's approval of information contained in the data message" (UNCITRAL 2001, p. 10).

Electronic signature must serve the same function as a handwritten signature. In that case, there is more than type of electronic signature; one particular type of electronic signature has been given high legal status (Scott et al., 2003). At the technical level, the digital signature guarantees authenticity, integrity, confidentiality and non-repudiation (Blythe 2005). Electronic signatures can be an effective and secure way of doing business over the Internet. Electronic signatures are not immune to forgery. The electronic signature is reliant upon a legislative regime that is supportive of EC systems. Electronic signatures also that rely on public key cryptography are also referred to as digital signatures. These signatures are technology-specific types of electronic signatures. The public key cryptography is based on an algorithm made by using two different related keys (Kisswani & Al-Bakri, 2010b). The first key is used for creating a digital signature or transforming data into seemingly incomprehensible form. The second key is used for verifying this digital signature or returning the message to its original form (Kisswani & Al-Bakri, 2010c). The public key and private key as mentioned above work as a pair, and any message and document that is encrypted with one key must be unencrypted with the other key. The signature can only be established by using the public key of the signer. If someone encrypted a transcript using public key, then it can only be decrypted using the private key (Scott et al., 2003).

3.7 Business-To-Business (B2B) Systems

The Internet has emerged as the global IS highway and as such the Internet is having a dramatic effect on all forms of EC systems. Although the B2B system is reliable, low-cost, highly accessible, supports high bandwidth communications and technically mature; there are still some valid concerns relating to the use and adoption of the B2B systems (Al-Bakri et al., 2010). Perhaps the most important reason for distinguishing B2B systems from other technologies is the notion that the adoption and use of B2B systems cannot be based on the same norm as was used for other technology adoption. (Barsauskas et al., 2008). Gunasekaran et al. (2002) define B2B systems from an applications viewpoint as a form of IT that electronically enables enterprise transactions among a variety of entities in order to satisfy organisational or individual objectives. However, Cunningham (2002) defines B2B systems as transactions between internal enterprise operations, such as marketing, sales, manufacturing, and support. Barsauskas et al. (2008) defined the B2B systems as the use of web based and electronic networks with the objective being to simplify and fasten all phases of enterprise processes; from the production of goods and services to the sale and delivery.

B2B systems are described as the deployment of any electronic tools to contact others for the purpose of business, including running any type of transactions with other enterprises (Turban et al., 2004). B2B systems range from the electronic transfer of funds between buyers and TPs, to Internet-based marketing, and intranet and extranet based information networks for both inter and intra organisational support (Turban et al., 2004; Zwass 2003). Kamel and Hussein (2001) in their study defined B2B systems as: "buying and selling of products, services, and information via computer

networks, primarily the Internet" (Kamel & Hussein, 2001, p.119). For the purposes of this research, the following definition of B2B systems was adopted:

“The sharing of business information, maintaining of business relationships, and conducting of business transactions with local and global business TPs by means of telecommunication networks” (Zwass 2003, p.8; 1996, p. 3).

The activities of B2B systems may involve the undertaking of normal commercial, government, or personal activities by means of computers and telecommunications networks and includes a wide variety of activities involving the exchange of information, data or value based exchanges between two or more parties. This definition besides including the tools used in EC systems, gives more details about the activities. Any activity required to reach any other major activity is considered a B2B systems activity. Therefore, B2B systems include a wide range of technologies and have no single standard definition (Thatcher & Foster, 2002).

This could lead to the conclusion that B2B systems can be described as the deployment of any electronic tools to contact others for the purpose of conducting business, including running any type of transactions with other enterprises. It seems self-evident that B2B systems should do business electronically; as it is also the means to transform industries and sectors, and introduce new methods of doing business and transactions between SMEs and their TPs in the same sector either globally or locally.

3.7.1 B2B System Adoption

The Internet is a worldwide collection of computers, routers, and networks connected together using the Transmission Control Protocols (TCP), and Internet Protocols (IP). As evidenced by the dramatic growth of B2B systems, the concept of using the Internet for trade and services has become the most recent idea in the industry. Moreover, the Internet appears to be the best method for putting B2B systems within the reach of large and SMEs. However, even with Internet and B2B systems, there are still considerable joint costs to adopting the systems and redefining processes on each side of the relationships, to take advantage of the long-term gains of B2B systems.

Schoenherr and Mabert (2008; 2006) and Fariselli et al. (1999) in their study looked at the three inter-related issues of globalisation, SMEs and B2B systems concluding that there are important synergies between virtual networks and real production networks. However, Urwin (2000) discusses how Internet and B2B systems between SMEs and TPs can help SMEs to get the right flow of information to their enterprise. At the same time, Keeney (2004) and Engsbo et al. (2001) developed a framework of B2B system adoption in SMEs that focuses on the relative power of the participants in a network and the type of product involved in the exchange. While, Jeffcoat and Feindt (2000) interviewed 27 SMEs in the UK to understand their approach to B2B systems in terms of the strategies adopted, the objectives sought, and the factors that they considered to be critical to their success in achieving these objectives. Steinfield and Whitten (1999) made an analysis of the influences and impact of the B2B systems on local communities. Schoenherr and Mabert (2008; 2006) concluded that while B2B systems contribute to the SME's internationalisation process, they also

contribute to strengthening the relationship between TPs in local communities. Furthermore, Chapman et al. (2000) developed and discussed a methodology mainly based on software and hardware solutions and intensive training, to address the needs of SMEs to use B2B systems to improve their competitiveness. A study by the Boston Consulting Group concludes that the transaction value of B2B systems completed over the Internet was more than \$2 trillion US in 2003, with nearly \$800 million in purchases made through B2B systems. In the auto industry, the big three automakers (GM, Ford, and Chrysler) have joined forces to create what could be the largest B2B systems exchange called COVISINT (Arbin & Essler, 2005). All TPs will be required to conduct their transactions via COVISINT, forcing a downward pressure on prices (Arbin & Essler, 2005; Venkat 2000).

Similar trends are visible in the computer industry, where Compaq and HP have joined together to verify an online data exchange process in computer parts. The grocery industry in the USA has completed a pilot test of B2B systems, which provides retailers and Direct Store Delivery (DSD) suppliers with the ability to carry out pricing, promotions, sales, inventories, invoices, and other data via the Internet (Schoenherr & Mabert, 2008). Table 3.1 illustrates a list of attributes and sources for the measures of B2B system adoption in developed countries.

Table 3.1
List of Attributes for the Measures of B2B Systems

Measures of B2B	Attributes	References
Operation efficiency	1-Improves manufacturability	Schoenherr & Mabert (2008; 2006), Fisher (2000)
	2-Maintains quality information systems	Wagner & Buko (2005), Swan et al. (2000)
	3-Provides information to management	Wagner & Buko (2005)
Cost saving	4-Reduces cycle time	Schoenherr & Mabert (2008; 2006), Lee & Lau (1999)
	5-Increases marketability	Arbin & Essler (2005), Spekman et al. (1998)
	6-Reduces administration	Schoenherr & Mabert (2006)
Inventory control	7-Reduces stock holding	Wagner & Buko (2005), Lewis et al. (1997)
	8-Just-in-time purchasing	Keeney (2004), Trappey & Trappey (1998)
	9-Provide flexible manufacturing system	Wagner & Buko(2005), Fisher (2000)
Manufacturing supply chain	10-Improves communication	Schoenherr & Mabert (2008; 2006), Mason-Jones et al. (2000)
	11-Builds up a global distribution network	Keeney (2004), Lummus & Vokurka (1999)
Customer focus	13- Products/ services Data available to global	Keeney (2004), Han (1997), Mclvor et al. (2000)
	14-Improves customer support	Keeney (2004), Chandra a& Kumar (2000)
TPs relationship	15-Alternative supply sources on global	Tucker & Jones (2000)
	16- link main suppliers through IS	Schoenherr & Mabert (2008; 2006), Keeney (2004), Venkat (2000)

Source: Developed for this research (Schoenherr & Mabert (2008; 2006) and Ang et al., (2000)

3.7.2 The Factors That Influence B2B System Adoption

Many factors need to be available in order to ensure the success of B2B systems. Some of these factors such as the enterprise's strategic direction, cultural approach , enterprises readiness, ICT infrastructure, economic developments and global networks have been listed by Wood (2004). For any enterprise to keep performing and competing, it should use the modest tools available to move parallel with TPs. Venkatesh et al. (2003) and Wixom and Todd (2005) also introduced additional factors that influence the perception

and intention of enterprise managers to adopt new IT and IS. Diffusion of Innovation (DOI) model as a technology acceptance model suggests five factors: relative advantage, compatibility, trialability, observability and complexity (Rogers 2003; 1995). Further, Bradford and Florin (2003) used Rogers' model and asserted that the three major factors impacting the adoption of innovation are technical compatibility, technical complexity, and relative advantage.

In understanding the adoption of B2B systems by SMEs, a key aspect is to look at the factors that influence the adoption (Chitura *et al.*, 2008). Experience of SMEs regarding B2B systems and the extent to which an enterprise feels ready to adopt B2B systems are considered the internal organisational factors (MacGregor & Vrazalic, 2005). Previous studies such as Chitura *et al.* (2008) and Kartiwi and MacGregor (2007) recognised that the support of top management, experience of enterprise managers and knowledge and awareness of enterprise managers about B2B systems were critical internal organisational factors in the adoption of B2B systems. They also noted that the size of the enterprise has been identified as an internal organisational factor of adoption of B2B systems. The level of IS and IT sophistication and readiness of local and global TPs have often been identified as external pressure factors to successful adoption of B2B systems. Table 3.2 lists previous studies examining the factors that influence the adoption of B2B systems in SMEs.

Table 3.2
List of Previous Studies Examining the Factors that Influence B2B System
Adoption in SMEs

Factor	Researcher
Internal Organisational Factors:	
Knowledge and Awareness of SME Managers (top management support)	Kaynak et al. (2005), El-Nawawy & Ismail (1999), Kartiwi & MacGregor (2007)
SMEs' strategic in practicing B2B systems	Kaynak et al. (2005), Brown (2002)
SMEs Readiness	MacGregor & Vrazalic (2005)
IT Skills	Bolongkikit et al. (2006), Kaynak et al. (2005)
External Factors:	
Pressure by TPs	Looi (2003)
Readiness of Local and Global TPs	MacGregor & Vrazalic (2005), Kartiwi & MacGregor (2007)
Practicing B2B Systems by Local and Global TPs	Chitura et al. (2008), Sahawneh (2005)
Global Networks	Taylor & Murphy (2004)
Telecommunication Infrastructure	Chitura et al. (2008)
Legal System	El-Nawawy & Ismail (1999)
Government Issues	Titi (2005), Sahawneh (2005)
Sector Size	Chitura et al. (2008)

Source: Developed for this research

3.7.3 Characteristics of B2B Systems

Brews and Tucci (2004) noted that the characteristics of B2B systems describe the various ways the B2B systems are applied in the enterprise, and include (1) the percentage of online transactions, (2) the extent and degree of adoption, (3) the direction of trade, (4) the transaction purpose, and (5) the role of the participants. On the other hand, Straub et al. (2003) say that enterprises that adopt B2B systems can be characterised into two categories based on the percentage of transactions and based on the level of information sharing conducted through the B2B system adoption.

Hence, the first category is comprised of enterprises that conduct virtually 100 percent of transactions and information sharing through B2B systems. However, the second category has been described by Straub et al. (2002) as comprised of enterprises that conduct less than 100 percent of their transactions and information-sharing through B2B systems. On the other hand, as the second characteristic of B2B systems, Brews and Tucci (2004) found that the extent and degree of B2B system adoption of both reach and richness is positively correlated with enterprise performance and efficiency. Turban et al. (2004) characterises B2B systems as direction of trade either horizontally oriented or vertically oriented. They noted that horizontal orientation refers to enterprise functions that are not directly involved in the production of finished goods, i.e. finance, marketing, and accounting, where vertical orientation refers to functions that are directly involved in the production of finished goods, i.e. material and supplies vendors.

Turban et al. (2004) also characterise the adoption of B2B systems by transaction purpose, i.e. the B2B systems is used for on time purchase of material and services on an open market where there are many of TPs. However, Jap and Mohr (2002) describe the participants in B2B systems as buyer, seller, intermediaries, or a combination thereof. Furthermore, Turban et al. (2004) defines intermediaries as online third parties that broker the relationship between enterprise and its TPs.

The type of activity practiced by the enterprise will determine the extent of B2B system adoption. Two previous studies Chwelos et al. (2001) and Brews and Tucci (2004) reported that the industry within which an enterprise operates might be instrumental in determining the degree to which an enterprise participates in B2B systems. Large enterprises usually have the power to guide the smaller TPs of the

preferred chain that should be used to satisfy their requirements (Brews & Tucci, 2004). The selection of satisfactory supply channels will provide the enterprise with proper procedures to provide their TPs in the appropriate time and help in preceding the objectives of the enterprise. In this concern, the selection of proper TPs will provide both responsiveness and efficiency.

3.7.4 Potential Benefits of B2B System Adoption

Several potential benefits of B2B systems are discussed in the literature. These include improved enterprise performance and efficiency through increase productivity, better quality, less inventory, cost reduction, increase sales, and growth the revenue and profit. Yau (2002) asserted that B2B systems could also reduce the need to carry and hold inventory because the information distortion created by demand and supply uncertainty, that encourages higher levels of safe inventory is reduced.

Procurement business process (PBP) is one example of a production cost that can potentially be improved through the reduction of transactions costs between enterprises and its TPs (Kauffman & Mohtadi, 2004; Cagno *et al.*, 2004). At the same time, B2B systems can improve efficiency through a reduction in order lateness and advanced inventory management and control. In addition, some enterprises report a reduction in the time necessary for the procurement material process, which should contribute to reducing order lateness (Presutti 2003). Furthermore, Bhatt and Stump (2001) noted that PBP, operation efficiency and timely and accurate inventory information could improve enterprise efficiency.

EC systems will help B2B systems to use the communication technologies and apply the speediest and best tool for business transactions to accomplish competence and

increase profit in the local and global markets (Titi 2005). Titi (2005) in his study also asserted that the effectiveness of using the available tools in B2B systems indicates that the business will increase the possibility and save time through using the most efficient methods in contacting suppliers. Efficient chains indicate more profitable business for the enterprise. B2B systems offer enterprises enormous opportunities to improve their performance. However, Kamel and Hussein (2001) asserted in their study that a shortage of skills has been categorised as one of the challenges facing global B2B systems. In B2B systems, the idea is to form a close relationship between two enterprises. This relationship involves the adoption of similar standards, extensive inter-enterprise communication and collaboration and joint IT investment. One of the main advantages of B2B systems adoption by enterprise is the reduction in costs associated with using an Internet standard rather than a proprietary standard (Barsauskas et al., 2008).

At the beginning of the development and adoption of B2B systems, most of previous authors such as Lewis (2001) and Coppel (2000) used to identify B2B systems as being the source of new format transactions that provided new possibilities for transaction process. Any enterprise must evaluate possible benefits and drivers prior to deciding to adopt B2B systems. Nevertheless, the failure of the B2B system adoption in SMEs is largely attributable to the lack of trust that enterprises have in the electronic tools and channels. Recent studies such as Chandra and Khan (2008) viewed trust of the B2B systems as an expectation of ability to perform, reliability and intentionality of TPs. They proposed also that trust of B2B systems has to be viewed as a behavioral intention or behavior that reflects dependence on the other TPs (Chandra & Khan, 2008). On the other hand, Parasuraman (2000) in his study shows that technologies readiness of SMEs'

TPs plays an important role in their attitudes toward B2B systems. B2B systems processing will change the traditional transactions and situation for SMEs. Instead of contracting different TPs, the SMEs will now contact EM only when they want to place orders or share information. At the same time, the EM is responsible for checking the information in the common database and finding the best solution for the SME. EM becomes the one shop in solving all orders for enterprises. Barsauskas et al. (2008) concluded in their study that most of the B2B systems applications are in the areas of supplier management (especially purchase order processing), inventory management (i.e., managing order-ship-bill cycles), distribution management (especially in the transmission of shipping documents), channel management (such as information dissemination on changes in operational conditions), and payment management, for example electronic payment systems or EPS.

3.7.5 Neutral Effects of B2B Systems

Research in IT is generally divided into two concentrations, IS studies that focus on the organisational/sociological factors of IS, and IT research that focuses on the technology factors, i.e. hardware, software, and infrastructure. Gunasekaran et al. (2002), Auramo et al. (2005) and Chitura et al. (2008) noted that B2B systems are regarded as the most promising application of IT for enterprises in recent years, because the revenue generated through B2B systems continues to grow. Therefore, SME managers need to know what factors contribute to the success of B2B systems in order to ensure that they are included in the adoption plan.

There are many studies such as Grey et al. (2005) and Gefen (2004) that report little or no benefit of B2B system adoption. Nevertheless, studies such as Chitura et al.

(2008), Kartiwi and MacGregor (2007), Davies (2003), Sahawneh (2005) and Craighead and LaForge (2002) found positive benefits of B2B system adoption in areas such as cost reduction, inventory control, cross-functional cooperation, sales, PBP and productivity. They suggest that the mixed results appear to accurately reflect a neutral effect of the benefits of B2B system adoption by enterprises on its performance and efficiency. Some mixed results could be attributed to an underestimation of enterprise performance, and difficulty in isolating B2B systems effects on enterprise efficiency (Zhu 2004). Hence, in other words, adoption of IT and IS applications such as B2B systems either worsened or did not improve enterprise performance and efficiency (Erber et al., 2008; Lee et al., 2005).

3.8 Theoretical Framework

This section provides the theoretical framework of this research. The main theories that provide a foundation for this study are Diffusion of Innovation (DOI), Technology Acceptance Model (TAM), and Transaction Cost Theory (TCT). Following is a discussion of these frameworks, beginning with organisational and technological innovation adoption, then DOI theory, TAM and describing the other related theories such as Organisational, Technological and Environmental Contexts (OTE) Model, Theory of Planned Behavior (TPB), value chain theory, contracting theory and Transaction Cost Theory (TCT).

3.8.1 Innovation Adoption

The first proposed concept of innovation was based on economics theory (Schumpeter 1939). Sundbo (1995) argued that most economic growth can be explained not only by the three traditional factors of (a) land, (b) labor and (c) capital, but also by the fourth factor, called “technology”. In addition, he noted that innovation in business practices usually is named Organisational Innovation. Daft (1978) defined the adoption of organisational innovation as “the adoption of an idea or behavior that is new to the organization adopting it” (p. 197). Further, prior studies regarding innovation adoption had identified various dimensions of factors that influence adoption of innovation by an organisation (Fichman & Kemerer, 1997; Tornatzky & Fleischer, 1990). Recently, the innovation of IS has been frequently examined in the context of organisational innovation. Based on Poutsma et al. (1987) classifications of organisational innovation, IS may be classified as process, technology-push, market-pull, planned and incidental innovation (Thong 1999). Hence, innovation is a means of changing organisations,

whereas innovation adoption is a process that includes the generation, development, and implementation of new ideas or behaviors (Rogers 2003).

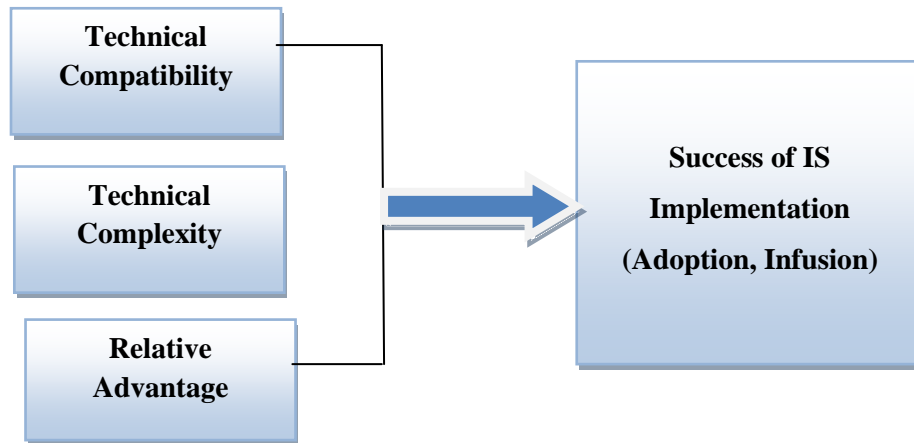
3.8.2 Adoption of Technological Innovation

The technological innovations have included EDI, Inter-organisational systems (IOS), open systems, customer based IOS, general information systems and more recently, EC systems (Fichman & Kemerer, 1997). A number of studies such as Cohen et al. (2003) and Cohen and Levinthal (1990) collaborated with strategic management theory, named Absorptive Capacity, to examine innovation adoption. Further, they suggested that innovation adoption decision be studied within appropriate contexts and that the variables affecting adoption should be specific to the innovation. Boynton et al. (1994) indicated that innovation adoption is influenced by the development of IT and IS knowledge. The researchers further indicated that the organisational climate is the key factor that influences the ability of organisations to absorb new technology-related knowledge. Studies by Tarofder et al. (2010), Yap et al. (1994) and Lind et al. (1989) showed that the SMEs are not willing to adopt technological innovations because of their small scale of operations and insufficient resources. Thong (2001) developed a resources-based model for SMEs based on Welsh and White's (1981) framework of resources constraints and Attewell's (1992; 1991) knowledge theory to explore barriers to innovation adoption in SMEs. In addition, Thong (2001) identified three barriers of to innovation adoption in SMEs. They are (a) highly centralised structure, (b) resource poverty and (c) knowledge deficiency.

3.8.3 Diffusion of Innovation (DOI)

The diffusion of innovation (DOI) model is comprised of five factors: relative advantage (RA), compatibility, trialability, observable and complexity (Rogers 1995; Rogers & Shoemaker, 1971). Rogers (1995) also noted that the first four factors are generally positively correlated with rate of adoption while the last factor, complexity, is generally negatively correlated with rate of adoption. However, Bradford and Florin (2003) used Rogers' model in IS applications such as web technology, web services, enterprise resource planning (ERP), I-EDI systems and SCM and they concluded that the three major factors impacting the adoption of innovation are; technical compatibility, technical complexity and RA. Hence, based on Bradford and Florin (2003) these three factors are used in this research. In addition, the other two factors; trialability and observability were disregarded in this research because incapability to use as measures to the B2B system adoption. In DOI theory, individual characteristics and strategic can be considered as internal organisational factors, especially in SMEs as characteristic of highly centralised structures (Prescott & Conger, 1995). Figure 3.2 represents the model for IS adoption and its effect on enterprise.

Figure 3.2
Diffusion of Innovation (DOI)



Source: (Bradford & Florin, 2003)

Bradford and Florin (2003) and Venkatesh et al. (2003) asserted that the influence refers to the actual benefits, which adopters perceive from using IT. These include improved productivity through better quality, less inventory, lower cost and improved delivery performance (Tarofder et al., 2010; Yau 2002; Spullber 1996). Hence, based on prior research in IT and IS, the adoption of B2B systems improve performance and efficiency by reducing data processing errors and ensuring that accurate specifications, due dates, and order quantities are transmitted throughout the enterprise (Vakaria 2002; Lee 2001). Further, based on DOI theory, Tarofder et al. (2010) and Cagno et al. (2004) conclude that B2B system adoption may reduce costs through greater information accuracy and information dispersion to relevant areas of the enterprise. In addition, Cagno et al. (2004) and Bhatt and Stump (2001) conclude that B2B system adoption enables changes in business processes that improve productivity. This occurs through the automation of functions such as production planning, procurement business process, order processing, inventory allocation and order fulfillment (Presutti 2003; SSMR 2002b). Prescott and

Conger (1995) reviewed seventy IS-related papers and concluded that Roger's (1995) DOI theory appears to be most applicable to innovation with an intra-organisational locus of impact.

3.8.4 Organisational, Technological and Environmental Contexts (OTE)

Tornatzky and Fleischer's (1990) OTE model has been widely used to examine the factors that influence organisational innovation adoption (Zhu et al., 2003). The OTE model includes the following three dimensions that affect innovation adoption; (a) organisational context, (b) technological context and (c) environmental context (Tornatzky & Fleischer, 1990). Similarly Rogers (2003) identified three characteristics as a background of innovation adoption in his DOI theory. The three characteristics are (a) individual characteristics such as individual attitudes toward change; (b) internal characteristics of organisational structure such as centralisation, complexity, organisational slack and size; and (c) external characteristics of the organisation such as system openness (Rogers 2003). Hence, the OTE model is consistent with DOI theory and can provide a useful starting point to examine organisational innovation adoption. In addition, Tornatzky and Klein (1982) found that the characteristics of relative advantage, complexity, and compatibility had more influence on the decision of innovation adoption than the characteristics of trialability and observability. Hence, this research adopts the characteristics of RA, complexity and compatibility of B2B system adoption in SMEs in Amman. Following are descriptions for these three characteristics:

1. Relative advantage (RA) is "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers 2003, p. 229).

2. Compatibility is “the degree to which an innovation is perceived as consistent with existing values, past experiences and needs of potential adopters” (Rogers 2003, p. 240).
3. Complexity is “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers 2003, p. 257).

3.8.5 Theory of Planned Behavior (TPB)

Ajzen’s (1991 and 1985) theory of planned behaviour (TPB) views the control that people have over their behaviour on a range from behaviors that are easily performed to those requiring considerable effort and resources. In this theory behavioural control is defined as one’s perception of the difficulty of performing a given behaviour (Ajzen, 1991). Ajzen (2002) has suggested that the link between behaviour and behavioural control should be between behaviour and actual behavioural control rather than perceived behavioural control. The difficulty of assessing actual control has led to the use of perceived control as a proxy (Ajzen 2002).

3.8.6 Value Chain Theory

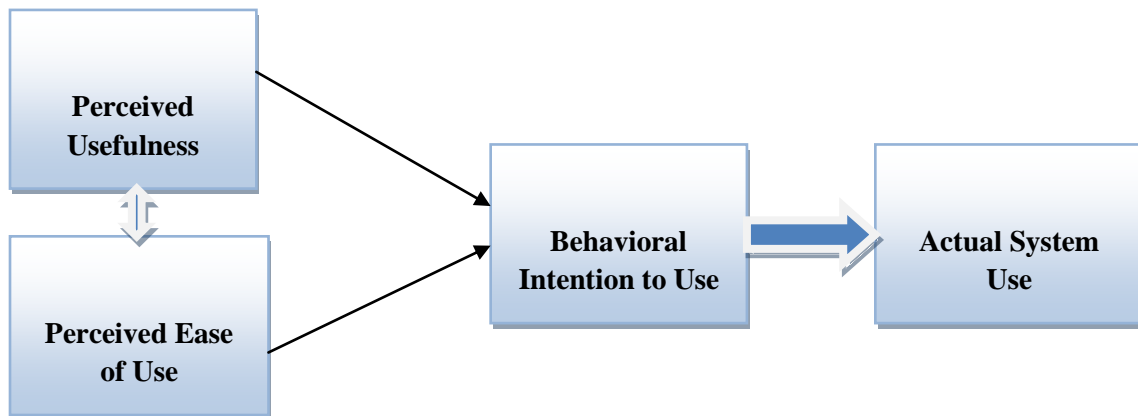
According to the Porter’s (1985) value chain theory, business activities can be divided into five stages; inbound logistics, operations, outbound logistics, marketing and sales, and service (Porter & Millar, 1985). Based on this theory, many researchers proposed various frameworks of e-commerce activities. Wu et al. (2003) used Porter’s theory as a framework that distinguishes IS and IT adoption into four distinct processes; communication, internal administration, order taking and procurement. Further, the researchers indicated that although the four processes cannot completely represent the

extent of B2B system adoption domains, they provide the major set of processes between internal and external organisational factors (Wu et al., 2003).

3.8.7 Technology Acceptance Model (TAM)

The original version of the Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action (TRA) to the field of IT and IS adoption (Ajzen 2002; 1991; 1985). TRA serves as theoretical foundation for TAM. In addition, TRA and TAM, both of which have strong behavioral elements, assume that when someone forms an intention to act, that they will be free to act without limitation. Previous researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (Venkatesh et al., 2003). Figure 3.3 represents the TAM model for IT and IS adoption in enterprise.

Figure 3.3
Technology Acceptance Model (TAM)

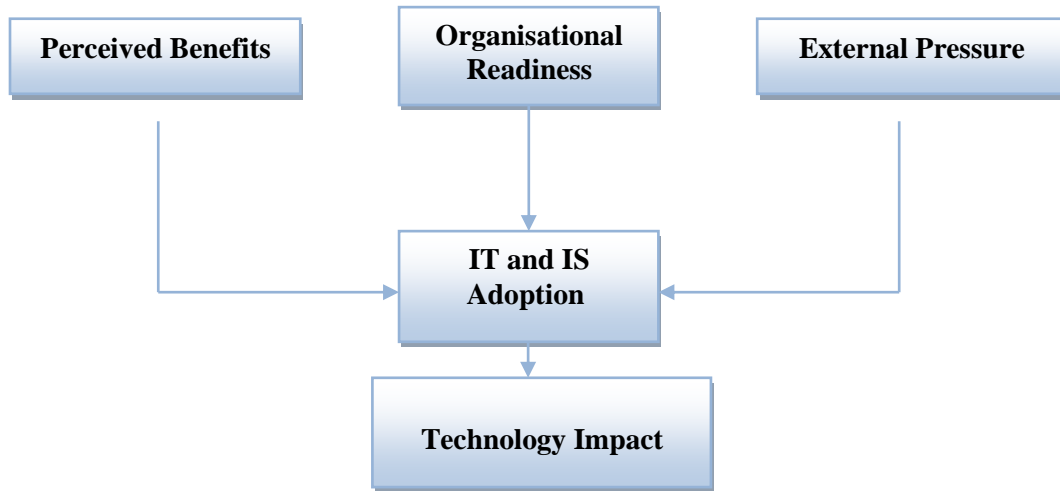


Source: (Venkatesh et al., 2003)

Davis (1989; 1986) found that TAM posits two most important variables: perceived usefulness and perceived ease of use, which determine an individual's intention to use a system, with intention to use serving as a mediator of actual system use. Venkatesh et al.

(2003) and Wixom and Todd (2005) also introduced additional factors such as social, cultural, and perceived credibility that influence the perception and intention of enterprise managers to adopt new IT and IS. In addition, based on TAM, research by Iacovou et al. (1995) found the major factors that influence the adoption of IT and IS in small enterprises are: perceived benefits of IT, organisational readiness, and external pressure by TPs. These three factors are adopted in this research. Iacovou et al. (1995) conclude that IS adoption by SMEs leads to change the way an enterprise does business. They also identified the cost saving benefit that could be achieved with adoption of IT. These cost savings includes reduction in costs of special handling and express freight, telephone cost, mailing cost, transportation expenses and cost of inventory levels. They also illustrated that SMEs with highly integrated, computerised processes were better prepared to undertake integrated IT and IS, which increased the impact of the technology and provided greater benefits. Figure 3.4 represents the factors influence on IT and IS adoption, and its effect on enterprise.

Figure 3.4
Factors Influence on IT and IS Adoption in SME



Source: (Iacovou et al., 1995)

Straub et al. (2003) carried out a series of investigations in Arab countries using TAM and found it was applicable. Hence, this research depends on specific factors from TAM and DOI theories; perceived usefulness, perceived ease of use, technical compatibility, technical complexity and relative advantage to study the factors that influence the adoption of B2B systems in SMEs in Amman and its influence on their performance and efficiency. These factors include internal and external organisational factors such as characteristics of SMEs, experience and perceptions of SME managers, SME readiness and external pressure by local and global TPs.

3.8.8 Contracting Theory

Grossman and Hart's (1986) contracting theory characterises enterprise relations as a two period game. In the first period, enterprises independently make investments that influence the value of a jointly produced product. In the second period, the enterprises jointly produce the product such that the value of that product depends on the

investments made in the first period (Hart & Moor, 1988). The important insight to contracting theory is that the initial investments are non-contractible, and thus the ending value is not contractible *ex ante*. In general, this implies that there will be under-investment by enterprises that perceive that they will have little *ex post* bargaining power (Hart & Moor, 1990). In addition, Hart and Moor (1988) concluded that the contracting theory has been extended in a variety of ways to inform management practices. Further, Brynjolfsson (1994) extends the framework of the contract theory to include information assets and derives a variety of propositions about the impact of IT on industrial organisations. Van Alostyne et al. (1995) apply contracting theory to database ownership to make the case for distributed databases, hence, that the counterparts to which the data is most important own the data and thus will make the greatest investment in the data.

3.8.9 Transaction Cost Theory (TCT)

This theory is an analysis of the behavior of enterprises that examine inputs, costs, production methods, sales and profits. The theory also assumes that profit maximisation is the main goal of enterprise (Meese, 2004; Jensen & Meckling, 1976). Li (2008) reports that Ronald Coase set out his Transaction Cost Theory (TCT) of the firm in 1937, in the classic article, 'The Nature of the Firm', in which he described markets and hierarchies as alternative governance structures. This makes it one of the first attempts to define the enterprise theoretically in relation to the market. Transaction cost theory is defined as the basic theoretical framework that analyses the relationship between the service provider and the customer process (Frauendorf 2006). Therefore, with reference to the efficiency aspect of the service, transaction cost theory not only represents the link

between those two processes but it also offers an explanation of why they have to be understood as a comprehensive process entity (Cordella 2006).

Li (2008) noted that TCT provides an economical view of a fundamental rule in the economics world. Reducing transaction costs encourages transactions occurring. The unit of analysis in TCT is a transaction, which “occurs when a good or service is transferred across a technologically separate interface” (Williamson 1985, p.1). TCT represents one of the few logical bases that enterprise managers can use when they adopt IT (Li 2008; Subramaniam & Shaw, 2002; Bhatt & Stump, 2001; Spullber, 1996). Implementing a new IT is generally seen as a means for reducing the transaction costs of an enterprise. However, in practice, implementing new IT often results in higher transaction costs (Cordella 2006). This is because the amount of information that needs to be processed by the enterprise increases (Cordella 2001). In addition, Cordella and Simon (1997) noted that if these costs exceed the benefits of IT, then the implementation becomes something negative and expensive. Li (2008) also concludes that any format of the future Web and IT evolution has to have cost reduction at its core. Hence, in this research, the research questions and hypotheses will mainly be based on the understanding and adoption of transaction cost theory. In addition, this research serves to stimulate discussion on the applicability of using TCT to explain the influence of B2B system adoption on performance and efficiency in SMEs in Amman.

Based on this theory, several potential benefits and reasons to adopt B2B systems in SMEs in Amman to reduce transaction costs are discussed. These benefits include increased operational efficiency, better customer services, improved TPs’ relationships, decreasing transaction costs and an increased ability to compete (Presutti 2003; SSMR

2002b; St.John et al., 2001). Further, this theory has been used by researchers such as Li (2008), Kauffman and Mohtadi (2004), Cagno et al. (2004), Toy (2001), Bhatt and Stump (2001) and Spullber (1996) who have mentioned benefits and reasons in IT adoption in SMEs such as cost, inventory, productivity, procurement process, sales and cross-functional cooperation. This evidence suggests there are mixed results of benefits and drivers of IT impacts on performance and efficiency in SMEs (Presutti 2003; Subramaniam & Shaw, 2002; SSMR 2002a). Adoption and appropriate use of B2B systems can be expected to result in enhanced performance and efficiency. Further, managers of SMEs in Amman need to know what factors and reasons contribute to B2B system adoption and its impact on SME performance and efficiency to ensure they are included in the implementation plan and strategy. Therefore, TCT is appropriate to use in this research, which examines how B2B systems can reduce transaction costs associated with selling and purchasing activities (Kauffman & Mohtadi, 2004; Cagno et al., 2004). The adoption and appropriate use of B2B systems can be expected to result in enhanced the enterprise's performance and efficiency. The following Table 3.3 shows a summary of IT and IS innovation adoption research.

Table 3.3

Summary of IT and IS Innovation Adoption Research

Authors	Study	Factors	Variables
Tarofder et al., 2010 Looi 2003	Critical factors for diffusion of web technologies for supply chain management functions: Malaysian perspective EC by SMEs in Brunei Darussalam	Internal and external organisational factors	Relative advantage IT knowledge Competitive pressure Government support Security
Erber et al., 2008 Ching & Ellis 2004	An economic assessment of ICT adoption and its impact on innovation and performance EC adoption by SMEs in Hong Kong, with emphases on online marketing	Innovation and company performance Decision-maker characteristics	Decision-makers age Decision-makers level of education Decision-makers cosmopolitanism
		Innovation characteristics	Perceived advantages & compatibility of the Internet Perceive cost of going online
		Environmental characteristics	Pressure from customers
Tarofder et al., 2010 Tsao et al., 2004	Critical factors for diffusion of web technologies for supply chain management functions: Malaysian perspective Critical success factors in adoption of B2B E-Commerce by SMEs in Taiwan	Internal and external organisational factors Internal factors	Integrating Internet with marketing strategy Organisational readiness Staff resistance Top management support
Erber et al., 2008 Wu et al., 2003	An economic assessment of ICT adoption and its impact on innovation and performance E-Business adoption and its impact on business performance in US technology firms	Innovation and company performance Firm characteristics	Top management emphasis Organisational learning ability
		Competitive environment	Normative pressure
Lertwongsatien & Wongpinunwatana, 2003	E-Commerce adoption by SMEs in Thailand- comparison by organization type (adopters,	Organisational factors	Size Top management support Existence of IT department

	prospectors, laggards)	Technology factors	Perceived benefits and compatibility
		Environmental factors	Competitiveness
Lee et al., 2005	Efficiency analysis of controls in EDI applications	Organisational Context	Organization readiness
Henriksen 2004	IOS adoption motivators, specifically EDI in Denmark	Environmental Context	Competitive pressure
		Technological Context	
Tarofder et al., 2010	Critical factors for diffusion of web technologies for supply chain management functions: Malaysian perspective	Internal and external organisational factors CEO characteristics	Innovativeness IS knowledge
Thong 1999	IS adoption by SMEs in Singapore	IS characteristics	Relative advantages Compatibility Complexity
		Organisational characteristics	Business size Employees' IS knowledge
		Perceive benefits/ relative advantage	Direct benefits Indirect benefits
Lee et al., 2005	Efficiency analysis of controls in EDI applications	Perceive benefits/ relative advantage	Direct benefits Indirect benefits
Iacovou et al., 1995	EDI adoption in Small organization in Canada	Organisational readiness	Financial resources Technological resources
		External pressure	Competitive pressure Imposition by TPs
Lee et al., 2005	Efficiency analysis of controls in EDI applications	Inter-organisational variables	Customer support Customer expertise Competitive pressure
Ramamurthy & Premkumar, 1995	EDI diffusion in US companies	Organization variables	Internal support EDI benefits potential EDI compatibility

Source: Developed for this research

3.9 Security and Business-To-Business (B2B) Systems

To assist the B2B system adoption within the enterprises, the software and hardware that would make up the computer networks are essential resources. They help the staff of enterprises in carrying out their everyday duties and also help the various trading and financial partners and individual clients to access the new system online, and without these computer networks, many of the important communication systems would not exist. Stamp (2005) asserted in his study that information sharing such as B2B systems and security investment are essential in today's Internet era.

Enterprises naturally find incentives to invest in security technology, but incentives for information sharing such as B2B systems are harder to furnish. Stamp (2005) also mentioned that aside from some cases where confidentiality plays a role, information sharing is usually collectively beneficial. These benefits are voluntary disclosure of proactive steps toward improving information security, voluntary disclosure of information security vulnerabilities and voluntary disclosure of information security breaks. In addition, information sharing such as B2B systems and security investment gradually becomes more important for productivity, profits and public policy of enterprises (Kisswani & Al-Bakri, 2010a).

Assessing costs and benefits of information sharing and security investment, interlinked with other strategies to gain competitive advantage, needs an accounting foundation (Rezgui & Marks, 2008). Rezgui and Marks (2008) also mentioned that the security of interlinked information systems especially B2B systems depends on the strategies about information sharing and security investment chosen by the enterprise.

3.9.1 Definition of Information Sharing and Security

Today, information sharing is critical to almost every enterprise. Also the open flow of information gives consumers real choice in conducting their daily affairs (Peltier 2001). In addition, Rank and Schmitt (2005) asserted that information technology has also radically altered the management of supply chain operations, many business partners who are adjacent on the supply chain can gain from entering inter-organisational information sharing relationships and sharing information that was previously accessible to only one of them. Therefore, information sharing systems allow businesses to determine TPs needs accurately and meet those needs efficiently and permits TPs to be informed rapidly and at low cost of those opportunities in which they are most likely to be interested. Hence, responsible sharing of personal information enhances the productivity of the enterprise's economy and generates significant benefits for its TPs (Gerber & Von Solms, 2008). In addition, Gerber and Von Solms (2008) said typically, the development of inter-organisational information systems and the sharing of information are mainly targeted at increasing operational efficiency by reducing ordering costs, inventory costs and supply lead times. Many studies have focused on studying the information sharing technology issues and estimating the value generated from these arrangements using traditional models of inventory and ordering costs. For example, Kritzingera and Smith (2008) mentioned that through information sharing, the ready availability of personal information facilitates a vibrant economy, improves efficiency, reduces costs, creates jobs and provides valuable products and services that people desire within an enterprise.

The key goals of information security are to protect the confidentiality, integrity and availability of information. Information security is concerned with the confidentiality; integrity and availability of data regardless of the form the data may take (Rank & Schmitt, 2005). Hence, all forms of information security in an enterprise are driven by 'business' needs. This means that security must reflect the enterprise perspective and contribute to and not hinder the enterprise goals and objectives. All this makes information security a governance and management issue (Hausken 2007). In addition, the primary business benefit of information security in enterprise is avoiding loss through security failures. These losses usually have an economic dimension, either directly or indirectly. However, good security management presents opportunities for other benefits such as improved operational and administrative efficiency and effectiveness (Thanasankit 2002). Nevertheless, without information security, the fortunes of the new economy so dependent on information may be short lived. Furthermore, it is the role of information security to provide the basic requirements to successfully integrate security into IT in a manner that properly addresses real threats. While the goal of information security is to ensure the confidentiality, integrity, and availability of information, the role of information security is essential for the protection of consumers, businesses and governments from the threats caused by the natural advancement of IT (Kisswani & Al-Bakri, 2010a). Information security poses considerable risks to information sharing such as B2B systems that are connected through networks. Information security can also result in the systems and the networks to run randomly, cause loss of information, and information to be become corrupted, with the associated loss of productivity and operation efficiency for the enterprise (Hausken 2007).

Cybercrime can be defined as all the criminal offences that are committed with the aid of communication devices in a network such as the Internet, the telephone line or the mobile network (Stamp 2005). Such acts commonly include unauthorised access to computer files and/or theft of proprietary information, disruption of information housed in a remote computer with viruses, Trojans* (do you need to define what a Trojan is?), worms, logic bombs and denial of service (DOS) attacks, selling illegal objects and substances over Internet, and the theft and forgery of identity (Hausken 2007). Like retailers and service providers, most websites that produce income could stand to lose money in the event of downtime created by cyber criminals.

As Internet-businesses have increasing economic importance to many countries, cybercrime has also become more political and therefore "terror" related (Westby 2003). Less common crimes are more institutionally targeted, such as organised assaults on a nation's network infrastructure; the hacking of government, commercial, or non-profit web-sites; or attacks on critical infrastructure (Stamp 2005). On the other hand, the costs that are affected by the cyber attacks can be extremely high for an organisation and the effects of cybercrime can also be felt far from the place where the crime is committed. It can also greatly weaken a country's economy, thereby stripping it of its resources and to an extent making it more vulnerable to military attack. Cyber terror can also affect many Internet-based businesses.

3.9.2 Threats to B2B Systems Security

Layton (2006) showed that governments, enterprises, and other large institutions require establishing Internet security strategies in response to these perceived threats against and through the B2B systems. Schperberg and Kenneth (2005) noted that at the technology level, such strategy involves employment of software for access control through firewalls and content control, authentication by using biometrics and smart tokens, authorisation by defining the user rights and privileges, provision of system integrity such as antivirus and integrity checking software. They also added at the technology level; cryptography such as digital signatures, constant auditing and monitoring by the use of intrusion detection and prevention systems, computer forensics, configuration management and assistance such as managing networks, security patches (Schperberg & Kenneth, 2005). On the other hand, Westby (2003) mentioned in his study a range of relevant laws and policies that are to be implemented in an effort to promote cyber security. He also added these policies could be commonly aimed towards critical infrastructures, such as defense, energy, food distribution, financial services and healthcare facilities. In addition, other policies include research of actual and potential security threats and the development of adequate methods of response, information sharing such as B2B systems, and policy actions through enforcement of laws and regulations, surveillance and data retention and data protection (Layton 2006).

3.9.3 Ethics and Security of B2B Systems and Appropriate Adoption

Ethics, security and appropriate adoption of B2B systems are to be followed by the TPs of enterprise, while making transactions or communication online by using the web based transaction systems. The transactions that are carried out by the TPs should be made extremely secure as loss of sensitive data, such as the financial data, can be very dangerous for the TPs to face the consequences (Kisswani & Al-Bakri, 2010a). Hence using levels of security systems is very important to protect and secure sensitive data over the networks. The proper ethical practices and adoption of the TPs are very important to maintain consistency in applying all the guidelines to the enterprise's new web based transaction management systems (Easttom 2006). The following guidelines would aid in reducing or minimising the risks and the security threats are faced to the newly adopted systems such as B2B systems by enterprise (Easttom 2006).

1. The enterprise's code of conduct guides the TPs in what is accepted practice and behavior and sets the ethical standards at a level above the law.
2. The enterprise recognises that fraud prevention requires the maintenance of an ethical climate that encourages all the TPs to be active in protecting the B2B systems privacy, and in reporting any breaches of accepted standards.
3. All TPs must be mindful of their responsibility to foster and develop in their areas the highest standards of ethical behavior and commitment to a highly ethical culture throughout the network.

Online security can also be achieved by using secure login systems to the TPs, limiting the access to the web based transaction system to only the appropriate TPs.

However, a report by Hausken (2007) mentions that SMEs' causes for the adoption of B2B systems strongly concern of SMEs' factors such as trust of the B2B systems, legal support issues, instant satisfaction and risk avoiders (Hausken 2007). Trust of the system is the main factor. Hence, trust is basically a willingness to rely on an exchange partner in whom one has confidence. Morgan and Hunt (1994) and Easttom (2006) explain trust is an expectation of ability to perform, reliable and intentional of TPs. SMEs around the world frequently do not trust B2B systems for many reasons; the first reason is security of the B2B systems. Black et al. (2000) in their study asserted most enterprises and their TPs are not satisfied with the infrastructure of web, and Internet security systems.

Secondly, reliability is associated with technical performance of the SME's website, particularly the extent to which it is available and operates properly. In addition, Zeithmal et al. (2002) focused on reliability as it involves accuracy in transactions and information, keeping records correctly, and performing the services and products between enterprises and TPs at the selected time.

The final reason relates to uncertainties about perceived risk of B2B system adoption. Perceived risk can cause SMEs to accept or reject of B2B system adoption (Easttom 2006). It is also related to reliability and B2B systems failure. Walker et al. (2003) mentioned in their study that SMEs as customers of TPs are worried that technology-based web and Internet service delivery and transaction methods will not work as expected.

3.10 Small and Medium Enterprises (SMEs)

SME is the recognised abbreviation for Small-and-Medium Sized Enterprises. A number of studies have used the number of employees as a measure of enterprise size (Thong 1999; Kartiwi & MacGregor, 2007). Other studies have identified enterprise size based on annual turnover (Ramamurthy et al., 1999). Some studies have applied both the number of employees and the revenue as indicators of enterprise size. A wide review of the literature, Simpson and Docherty (2004), Stockdale and Standing (2006), and Kartiwi and MacGregor (2007) suggests that SMEs have the following characteristics: strong owner influence, centralised power, lack of specialist staff, small management team, multifunctional management, unwillingness to take risks, low employee turnover, lack of the necessary expertise and avoidance of sophisticated software or IT applications' adoption.

Despite governments and many of the multinational organisations targeting SME sector for special technology and financial business support, there is no single definition for a SME either nationally or internationally. In the United Kingdom (UK), the Companies' Act of 2006 defines a SME for the purpose of accounting requirements a small enterprise being one that has revenue of not more than £6.5 million, a balance sheet total of not more than £3.26 million and not more than 50 employees. A medium-sized enterprise is characterised as one that has revenue of not more than £25.9 million, a balance sheet total of not more than £12.9 million and not more than 250 employees (SBS/Statistics Unit 2008). In addition, statistics for 2007 published in 2008 by the Small Business Service (SBS) Statistics Unit also show that out of 4.7 million enterprises in the UK, 99.3 percent were small enterprises with fewer than 50 employees

and 0.6 percent were medium enterprises with 50-249 employees (SBS/Statistics Unit 2008).

The definition of Small-to-Medium Enterprises in the United States of America (USA) is set by a government department called the Small Business Administration (SBA) Size Standards Office. The SBA uses the term 'size' to indicate the biggest a concern can be, in order to still be considered a SME, therefore, the enterprise in USA with less than 100 employees is classified as small, while if the number of employees ranged from 100 to 500, it is classified as medium (Kartiwi & MacGregor, 2007; SBA / Standards Office 2007).

The majority of the Australian workforce are employed by SMEs (ABS 2003). ABS defines the enterprises from one up to 20 employees as small enterprises, while the enterprises that are composed of from 21 up to 200 employees are described as medium enterprise (MacGregor 2004; Beynon *et al.*, 2002). However, the European Commission published the new recommendation 2003/361/EC, which entered into force 1st January 2005 concerning the definition of micro, small and medium-sized enterprises. Micro enterprise has a headcount of less than 10 employees. A small enterprise has a headcount of less than 50 employees, whereas a medium-sized enterprise has a headcount of less than 250 employees (Kartiwi & MacGregor, 2007). In Germany, if the enterprise has up to 500 workers, it is considered SME; while in Belgium if the number does not exceed 1000 then the enterprise is classified as SME.

Due to the wide variation of the classification of SMEs among the European countries, the European Union (EU) finds a common classification for the member countries. EU recognised SMEs that have fewer than 250 employees and those that are

independent from larger enterprises, where annual turnover is not to exceed \$50 US million or balance sheet totals not to exceed \$43 US million (Kartiwi & MacGregor, 2007).

SMEs are, arguably, the bedrock of any developing economy. In general, SMEs are the base upon which future economic and employment growth can be built. SMEs over the world remain buoyant despite mounting economic and social hardships (Saleh & Ndubisi, 2006). Furthermore, economists agree that SMEs play a vital role in the socio-economic fabric over the world. With all changes and the growing demand for higher quality modern products and services, many traditional SMEs over the world face closure or difficulties upgrading. Even modern SMEs in developed countries face very difficult competitive challenges in the emerging setting (Sanjay 2000). SMEs form a considerable percentage of the working enterprises in most countries. The success and competence of these enterprises will support many of purposes including the GDP and solving the social problems related to unemployment. Saleh and Ndubisi (2006) described SMEs as the backbone in the development of the country. Therefore, most of countries care for this sector because of its vital importance in economy as the percentage of SMEs may exceed 70 percent of the total working enterprises in some countries. The interest of researchers for this sector is to provide methodologies to develop this sector.

3.10.1 Characteristics of SMEs

Not only do the definitions of SMEs vary as mentioned before, but also there are broad ranging views on the characteristics of SMEs. There have been many studies that have attempted to define the characteristics of SMEs (Kartiwi & MacGregor, 2007). Therefore, it is appropriate that current research examine some of the characteristics found in the literature. Table 3.4 provides some of the main characteristics for SMEs

Table 3.4
Main Characteristics for SMEs

Characteristics of SMEs	
Strong owner influence	Centralised power
Small management team	Multifunctional management
Unwillingness to take risks	Low employee turnover
Avoidance of sophisticated software	Avoidance IT applications' adoption

Source: Developed for this research

One of the most important characteristics of SMEs is that the manager is the owner of the enterprise (MacGregor 2004). This indicates that the enterprise's strategic, or shifting from one system to another, should start with the owner of the enterprise. Making change inside SMEs is not simple; because the managers require a solid base to rely on to accomplish any new success when making a change (Kartiwi & MacGregor, 2007). Moreover, the SMEs' strategic in practicing EC systems requires new expenses since these enterprises depend on low capital investment. These expenses should meet with tangible returns to be approved by managers. This feature is presented in SMEs as being a small independent enterprise and producing for well-known markets (MacGregor & Vrazalic, 2005). The products and services of these enterprises are considered another limitation that lead to IT and IS changes in these enterprises.

The products and services of these enterprises are characterised as being specialised for sale to the local or global markets. These enterprises rely on cheap raw materials and low production costs in general, which makes these enterprises concentrate on specific category of customers (Simpson & Docherty, 2004). A number of recent studies such as MacGregor (2004), MacGregor and Vrazalic (2005) and Kavainauskaite et al. (2005) have shown the differences in management style between large enterprises and SMEs. They also noted that among other characteristics, SMEs tend to have a small management team; hence, they are strongly influenced by the owner. In addition, in SMEs, the IT infrastructure is not well established compared to large enterprises (Beynon et al., 2002). The lack of well established IT infrastructure might lead to new financial overload for the enterprise. In SMEs any further expenses should be met by new income.

This means the investment in B2B systems in SMEs should be reflected through either increasing savings related to marketing and communication or increasing the income of the enterprise. Both consequences are not clear for SMEs managers and that make adoption of B2B systems very difficult. In addition, the evaluation of SMEs strategic shows the existence of specific factors that determine the success of B2B systems in SMEs (MacGregor & Vrazalic, 2005). Furthermore, the experiences of other counterparts such as TPs in adopting B2B systems and the advantages accomplished may encourage the new adopters to join the B2B systems in narrow aspects. This wide range of SMEs characteristics are summarised in Table 3.5.

Table 3.5
Characteristics of SMEs

Characteristics	Study
Externally uncertain	Chong (2006)
Decisions are intuitive	Chitura et al. (2008), Bunker & MacGregor (2000)
Strong owner influence	Kavainauskaite et al., (2005), Murphy (1996)
IT decisions are usually made by the owner	MacGregor & Vrazalic (2005) Bunker & MacGregor (2000)
Informal and inadequate planning	Tetteh & Burn (2001), Miller & Besser (2000)
Reluctance to take risks	Kartiwi & MacGregor (2007), Walczuch et al. (2000)
More reluctant to spend on technology	Chong (2006), Walczuch et al. (2000), Dennis (2000)
Strong desire for independence	Chitura et al. (2008), Dennis (2000), Bunker & MacGregor (2000)
Small centralised management	Chitura et al. (2008), Bunker & MacGregor (2000)
Lack of technical staff	Martin & Matlay (2001), Bunker & MacGregor (2000)
Cannot compete with their larger counterparts	Kartiwi & MacGregor (2007), Quayle (2002), Lawrence (1997)
Narrow products/service range	Chong (2006), Bunker & MacGregor (2000)
Little training provided for staff	Quayle (2002), Bunker & MacGregor (2000)
Product oriented not customer oriented	Kartiwi & MacGregor (2007), Bunker & MacGregor (2000)
Intent on improving day-today procedures	MacGregor et al. (1998)

Source: Developed for this research

3.10.2 Usage of B2B Systems in SMEs

SMEs are slower to adopt IT and IS when compared to their large enterprise counterparts such as local and global TPs (Kartiwi & MacGregor, 2007). As with the literature on characteristics of SMEs many of the previous studies carried out on the adoption of IT and IS applications such as B2B systems by SMEs such as Kartiwi and MacGregor (2007), Chitura et al. (2008) and Kaynak et al. (2005) tried to represent differences between SMEs and their larger counterparts.

Previous studies such as Bunker and MacGregor (2000) and Kaynak et al. (2005) mentioned that the open nature of the Internet as a transaction infrastructure and its global nature have made trust a crucial element of B2B systems. At the same time, studies asserted that lack of trust has been touted as one of the main reasons for traders and SMEs not engaging in B2B systems (Matlay & Addis, 2003).

Trust in B2B systems gives SMEs and their TPs a sense of an overall control over their online transactions that positively influenced perceived behavioral control and transaction intentions (Pavlou 2001). Therefore, practicing B2B systems requires the availability of well-established infrastructure such as communication network and ISPs. In addition, studies such as Chitura et al. (2008) and Matlay and Addis (2003) noted that another enterprise feature that appears to be significantly associated with B2B system adoption is the level of IT expertise.

The number of SMEs characteristics and strategic, including enterprise size, sector, market focus and level of IT expertise are associated with adoption and use of B2B systems in SMEs. Literature of results and findings of B2B system adoption by SMEs are summarized in the following Table 3.6.

Table 3.6
Literatures of Results and Findings of B2B System Adoption in SMEs

Results and Findings	Study
Decision making on IT adoption differs from those made by large businesses	Chitura et al. (2008), Kartiwi & MacGregor (2007)
IT decisions are not based on detailed planning	Tang et al. (2004), Bunker & MacGregor (2000)
IT decisions are usually made by the owner	Chitura et al. (2008), Kartiwi & MacGregor (2007)
More reluctant to spend on technology	Kaynak et al. (2005), Walczuch et al. (2000), Dennis (2000)
Lack of technical staff	Kartiwi & MacGregor (2007)
Lack of IT expertise	Matlay & Addis (2003), Bunker & MacGregor (2000)
Limited use of technology	Kartiwi & MacGregor (2007); Utomo & Dodgson (2001)
Little IT skill or training	Chitura et al. (2008) , Bunker & MacGregor (2000)
Informal and inadequate IT planning	Kaynak et al. (2005), Tetteh & Burn (2001)
Management involvement is essential to IT success	Kartiwi & MacGregor (2007), Black et al. (2000)

Source: Developed for this research

To support the activities of B2B systems for SMEs many studies and projects over the world were conducted. Some of these projects were sponsored by World Bank to support the sector of SMEs due to its importance to economy (ESCWA 2003). There are a number of studies such as Chitura et al. (2008) and MacGregor (2004) that mentioned a variety of enterprise features affecting the adoption of B2B systems in SMEs. They also found that enterprise size category (small, medium and large) is significantly associated with the adoption of B2B systems and IT. Studies such as Kartiwi and MacGregor (2007) Matlay and Addis (2003) noted that those SMEs in

rural areas often report lower levels of success with IT and especially B2B system adoption when compared to those in capital cities. On the other hand, MacGregor (2004) found that enterprise sectors (industrial, service, trade etc.) are significantly associated with the level and type of B2B system adoption in SMEs.

3.10.3 Benefits of B2B System Adoption in SMEs

Kartiwi and MacGregor (2007) present those two types of benefits of B2B system adoption classified as direct and indirect benefits. Direct benefits result from the fact that information is sent electronically from one side such as SMEs to another enterprise such as TPs without human intervention. Both sides benefit from a reduction in errors and reduced human handling cost. Indirect benefits arise from leveraging B2B to enable the technology to change the way an enterprise does business. Indirect benefits include improved TP's relationships, improvements in performance and increased operational efficiency and increased ability to compete (Chitura et al., 2008). Availability of B2B systems in SMEs includes many advantages (Kavainauskaite et al., 2005; Iyer et al., 2004; Greenstein & Feinman, 2000):

1. Increases sales and exports of SMEs to enable them to enter global markets.
2. Reduces costs, especially for imports and increase export revenue.
3. Facilitates SMEs easily and constantly access to information on markets and investment opportunities.
4. Creates opportunities for self-employment as an opportunity to communicate directly to local and global markets at low cost investment possible.
5. Enhanced flexibility for access to counterparts such as TPs.

Earlier and recent studies such as Kartiwi and MacGregor (2007) and Quayle (2002) found the substantial benefits provided by adoption of B2B systems are divided into two categories either tangible or intangible benefits. Therefore, for convenience the finding results from previous studies are summarised in the following Table 3.7.

Table 3.7
Perceived Benefits of B2B System Adoption in SMEs

Benefits	Study
Reduce administration costs	Kartiwi & MacGregor (2007), MacGregor (2004), Quayle (2002)
Reduce production costs	Kaynak et al. (2005), MacGregor (2004), Quayle (2002)
Improved control inventory	Quayle (2002), Lal (2002), Riquelme (2002)
Increased sales	Chitura et al. (2008), MacGregor (2004), MacGregor et al. (2002)
Increased internal efficiency	MacGregor (2004), Tetteh & Burn (2001)
Improved relationship with TP	Chitura et al. (2008), Kaynak et al. (2005), MacGregor (2004)
Improved competitiveness	Kaynak et al. (2005), Vescovi (2000)
Improved marketing	Quayle (2002), Sparkes & Thomas (2001), Vescovi (2000)

Source: Developed for this research

Iyer et al. (2004) emphasised that enterprises typically adopt B2B systems for a variety of reasons; including a reduction in the time and cost to generate and transmit documentation, reduction in document transaction costs, elimination of data entry tasks, improvement to data integrity and reduction to work, institute electronic document error reconciliation and improve TPs relationships. It is clear that to achieve these benefits enterprises must sustain several costs including the development of the necessary IT infrastructure applications, technical adoption expertise, training costs and required software.

3.10.4 Barriers of B2B System Adoption in SMEs

B2B system practitioners have put forward a variety of reasons as to why this technology has not been adopted. The B2B systems literature (1995-2008) provides a discussion of a range of B2B systems barriers from the perspective of large and/or SMEs. The barriers of B2B system adoption in SMEs identified most consistently are shown in Table 3.8.

Table 3.8

The Barriers of B2B System Adoption in SMEs

Barriers	Study
The lack of B2B systems by TPs	Quayle (2002), Steele (2000), Paradi et al. (1996)
The difficulty associated with adoption B2B with the enterprise internal systems	MacGregor (2004), Davies (2003), Iacovou et al. (1995)
The high initial set-up costs associated with B2B	Chitura et al. (2008), Kartiwi & MacGregor (2007)
The lack of technical/financial resources required for adopting B2B	MacGregor (2004), Davies (2003)
The standards of B2B are used differently by TPs	Kartiwi & MacGregor (2007), and Quayle (2002)
The lack of SMEs management commitment to and/or support of B2B adoption	Chitura et al. (2008), Iacovou et al. (1995)
The incompatibility between hardware and software when SMEs adopt B2B	MacGregor (2004), Quayle (2002), Paradi et al. (1996)

Source: Developed for this research

3.10.5 SMEs in Jordan

Most of the SMEs in Jordan are run as family enterprises (DOS 2008). Jordanian SMEs are mainly directed to making small types of goods rather than having a strong industrial capacity in local, regional, and global markets. This eventually impedes the capacity of these enterprises to expand the scope of their products and services to local and global markets. In Jordan, Department of Statistics (DOS) classifies an enterprise with less than five employees as a small enterprise, while those with 5 to 19 employees are classified as medium enterprises (DOS 2008). The following Table 3.9 provides the economic sectors in Jordan and their contributions to GDP.

Table 3.9
The Economic Sectors in Jordan and their Contributions to GDP

Sector	GDP %
Industrial	18
Services	17
Trade	52
Agriculture	11
Construction	2

Source: (MIT 2008)

Table 3.10 shows the number of registered enterprises in Jordan by economic sectors.

Table 3.10
Number of Registered Enterprises in Jordan According to Economic Sectors

Sector	Number	Capital (JD Mill)
Industrial	55377	394.9
Trade	175775	904.6
Services	120188	333.8
Agriculture	376	4.6
Construction	2335	112.1
Total	354051	1750.0

Source: (MIT 2008; DOS 2008).

There are many international consultative institutions such as European-Jordanian Action for the Development of Enterprises (EJADA) and the US Agency for International Development (USAID), which are familiar with SMEs in Jordan and provide them with technical and financial support (DOS 2008). Free trade agreements between Jordan and other countries such as those in the European Union and the United States would be the most challenging reasons for SMEs in Jordan.

JADA's main objective is to upgrade the capacity building of all SMEs in Jordan to make them more effective on the local scene (MIT 2008). Therefore, EJADA introduces better opportunities for the Jordanian SMEs to set foot in European markets and be at a competitive level with Europe markets. Also it would filter the existing SMEs in Jordan to identify those that are capable and efficient enough to stay in the fierce competition with Europe, when the free trade agreement becomes effective in 2014 (MIT 2008).

The UN Industrial Development Organization (UNIDO) has recently launched a credit line for Jordanian SMEs, providing them with information on industrial opportunities, norms and effective regulations in Jordan (MIT 2008). Over the past few years, the Jordanian government provide the support to SMEs in Jordan including projects and programs that facilitate the access to required accurate information, consulting, and most importantly, access to credit and financial resources (DOS 2009a; 2008). The main two projects conducted via World Bank to support Jordanian SMEs are United States Agency for International Development (USAID) and National Fund for Enterprise Support (NAFES).

US Agency for International Development (USAID)

USAID aims to increase the sustainable competitiveness, market out-reach, sales and earnings. It is also aim to provide enterprise level assistance and commercially oriented services to private and public business support enterprises in a cost-effective manner.

National Fund for Enterprise Support (NAFES)

NAFES aims to assist the Jordanian SMEs in becoming more efficient and competitive with local and global markets by providing financial assistance to management modernisation projects aimed at improving their performance and capabilities. NAFES will strive to assure that its efforts are aligned with all other local efforts exerted towards enhancing the role of SMEs in the development of Jordanian economy and in elevating the standard of living of Jordanians. The initial capital of NAFES is obtained from a counterpart fund of a non-project cash grant donated by the government of Japan.

Consulting project and training programs provided by NAFES include:

- Business planning and management systems
- Production management
- Financial analysis / management
- Marketing analysis / sales support
- Feasibility studies
- Productivity improvement
- IT applications such as B2B systems

Despite the evident benefits obtained from the adoption of IT and IS such as B2B systems, SMEs are slower to adopt the technology compared to their large business counterparts (Kartiwi & MacGregor, 2007). This is particularly the case in developing countries such as Jordan where factors such as the lack of telecommunication infrastructure (Titi 2005; Wood 2004), further restrict the viability of using B2B systems (MacGregor & Vrazalic, 2005). Furthermore, König et al. (2003) noted that SMEs have more difficulties in attracting IT specialists to their enterprises, and they also do not have sophisticated distribution systems in comparison to large enterprises. Therefore, SMEs are not adopting B2B systems with the same speed as their larger counterparts.

3.11 The Enterprise Performance and Efficiency

Previous studies generally recognised independent variables such as productivity, market value, profitability, size and costs that have explanatory power when examining enterprise performance and efficiency (Grey *et al.*, 2005; Jobber 2001). The market values of enterprises are a fundamental component of the measure of performance. At the same time, profitability has been widely referred to as an indicator of enterprise performance. In addition, when the enterprise size becomes larger, management can be more experienced and it often adversely affects the enterprise's performance (Banker *et al.*, 2007).

B2B system adoption could affect the performance and efficiency of the enterprise through the usage of developed technologies that facilitate management of the enterprise using electronic tools. Brews and Tucci (2004) suggest that there are differences in attributes of the IT and IS applications, and the enterprise environment

that may affect the application and impact of the B2B system adoption on performance and efficiency. These attributes are infrastructure, volume and type of information shared between enterprise counterparts, and the length of time of B2B system usage (Turban *et al.*, 2004; Brews and Tucci, 2004; Hales *et al.*, 2002). The efficiency of the enterprise can be increased as the quality and volume of transferred information increases through the same enterprise and the other TPs (Gulati 2000). Therefore, in SMEs the adoption of B2B systems could depend on the extent of its application and the available infrastructure in the enterprise to facilitate of B2B systems' use. Efficiency is concerned with inputs and outputs and an efficient enterprise is the one that does things right (Jobber 2001). Banker et al. (2007) assert that efficiency means that cost per unit of output is low and, therefore, the potential for offering low prices to gain market share or charging medium to high prices and achieving high profit margins, is present. This research examines the SMEs performance and efficiency as dependent factors. However, the performance and efficiency of enterprises differs between large and SMEs. Therefore, the performance and efficiency of SMEs may be compared to a benchmark from the same field and sector, the performance and efficiency of SMEs compared before and after adoption.

3.11.1 Measures of Enterprise Performance

Measurement of performance in all enterprises, no matter how structured and re-utilised they are, depends on external judgments about what the important dimensions of the enterprise are and where the enterprise performance falls on each dimension. Many studies such as Tang et al. (2004) and Dewan and Kraemer (2000) show that IT applications such as B2B systems improve performance at a general level such as industry, supply chain level and economy level. However, Carr (2003) noted that few studies examine the effects of B2B system adoption at the enterprise level. He added that these studies suggest that B2B systems affect specific indicators of performance such as productivity and cost. The influence of B2B system adoption may be moderated by the length of use, because B2B systems may increase costs in the short term and reduce them in the long-term (Devaraj & Kohli, 2003). SSMR (2002b) suggests that production costs could be further reduced by improvements in productivity through adopting B2B system of several processes, such as production planning.

Nevertheless, none consider the effects of specific IT application such as B2B systems on performance in SMEs. Straub et al. (2003) say that enterprises adopting B2B systems in existing processes, activities and functions are often evaluated on performance, which include traditional outcomes such as economic value added, return on assets (ROA) and quarterly profitability. Studies such as Liao et al. (2003) suggest that IT applications such as B2B systems improve enterprise performance directly, i.e. without intervention. On the other hand, other studies such as Carr (2003) suggest that B2B system adoption affects enterprise performance indirectly through an unspecified form of mediation.

The literature is mixed on how best to measure the effects of B2B system adoption on enterprise performance. The major implication is that enterprise performance measures such as productivity, costs, sales and profitability have been used to evaluate performance more often than other metrics. Table 3.11 presents several items, which are used to measure the improvements in performance in enterprises.

Table 3.11
Items of Improvement in Performance

1. Reduced enterprise direct labor cost, Administration and production costs (Costs).
2. Improved enterprise on-time-delivery performance to your TPs and customers (Sales).
3. Reduced returns of products from TPs and customers, due to quality issues (Productivity and Sales).
4. Reduced the number of errors in transactions with TPs, Suppliers, and customers, due to products specifications, accounting, pricing, and quantities (Productivity, Sales, Profits, and Costs)

Source: Developed for this research, from (Iyer et al., 2004; Kim et al., 2006)

3.11.2 Measures of Enterprise Efficiency

Enterprise efficiency is generally defined as average inventory, operation efficiency, resources utilisation, order lateness and procurement business process (PBP) (Krajewski & Ritzman, 2002). The management literature also suggests that improvements in efficiency may be interdependent, meaning that an improvement in one measure changes another measure, e.g. inventory management and control, quality, operation efficiency, flow time and business process. Yau (2002) noted that B2B systems reduced the need to carry inventory because it reduced information distortion, created by demand and supply uncertainty that often leads to higher levels of buffer inventory. Inventory management and control is measured in this research because it used more often in studies measuring the effects of B2B systems on enterprise efficiency

than any other operational metric. Table 3.12 summarises some of the items used to measure the operation efficiency in enterprise as one of the efficiency measures.

Table 3.12
Items of Operation Efficiency

Reduced raw materials or component inventory carried by your enterprise
Reduced finished goods inventory carried by your enterprise
Reduced the number of errors in decision making process

Source: Developed for this research, from (Iyer et al., 2004; Kim et al., 2006)

Zwass (2003) classifies B2B systems infrastructure as the hardware and connectivity elements such as computers, the Internet, telecommunications networks and general connectivity technologies. Zwass (2003) also suggest that the level of B2B systems infrastructure in enterprise may affect efficiency because the appropriate level of infrastructure is crucial to achieving the benefits of B2B systems. In addition, the growth of the Internet and B2B systems infrastructure with respect to location can be traced using Internet geography (Yuko *et al.*, 2005).

Therefore, better information infrastructures such as improved networks, will improve internal PBP by eliminating duplicate efforts and preventing documentation errors (Bendoly & Schoenherr, 2005). The level of infrastructure in the enterprise alone is not sufficient to examine the effect of B2B systems on enterprise efficiency (Brews & Tucci, 204). In addition, Brews and Tucci (2004) conclude that the type of information shared and the volume of information shared are both important to obtaining the benefits of B2B system adoption. Furthermore, Craighead and LaForge (2002) find that the degree and extent of information sharing through B2B system adoption with TPs and internal functions are all correlated with improved enterprise efficiency.

In addition, Brews and Tucci (2004) suggest that enterprise environment such as position in sector, may moderate the influence of B2B systems on enterprise efficiency.

In a review of the literature, multiple studies find that benefits due to B2B system adoption are indirect and mediated by changes in PBP (Subramaniam & Shaw, 2002). The major PBPs are order fulfillment, supply cycle, customer service and new product development (Anupindi *et al.*, 1999). Further, in an exploratory study, Mukhopadhyay and Kekre (2002) identify several individual PBPs at the operational level that utilise IT applications such as B2B systems to improve efficiency. Subramaniam and Shaw (2002) suggest that PBPs that are highly structured can be highly automated. Table 3.13 shows the major dimensions and definitions of PBP.

Table 3.13

Dimensions of Procurement Business Process (PBP)

(1) Identifies the needs for products and services
(2) Communicates needs for products and services from and to TPs
(3) Qualifies TPs
(4) Confirms orders from and to TP

Source: Developed for this research, from (Mukhopadhyay &Kekre, 2002)

Anupindi et al. (1999, p.72) define a PBP at general level as, “Any activity that consumes resources in converting inputs into outputs”. In addition, they define the major business processes as order fulfillment, production, supply cycle, customer service and new product development. Further, procurement is described as part of the supply cycle, which includes several sub-processes such as needs identifications, order placement, and order receipt processes (Anupindi *et al.*, 1999). Nurmilaakso and Kotinuemi (2004) find that improved flow of communication and information leads to improved business

processes. Muffatto and Payaro (2004) suggest that improvements in PBP that support procurement activities improve several elements of the procurement cycle in enterprises.

3.11.3 Effects of B2B System Adoption on Performance and Efficiency in SMEs

B2B systems support the transactions between enterprises and TPs. They also contribute to new sources of revenue and opportunities for SMEs with carefully structured strategies. In addition, SMEs can adopt B2B systems and networks based as a business tool to provide and publish information about their products and services to targeted market and TPs and to offer technical support and to receive payments. B2B-EC systems affect the efficiency of the business through the usage of highly developed technology that facilitates management of business using electronic tools (Wu *et al.*, 2003). B2B systems are expected to facilitate the interaction of the enterprise with TPs. In addition, B2B systems tools provide information directly about the suppliers of the enterprise and complete information about them (Shaw & Subramanian, 2002).

Such technology in large enterprises decreases the amount of raw material stored by the company due to the scheduled deals and contracts with suppliers. In the large enterprise B2B systems helps in managing the total quality management of the enterprise. Furthermore, enterprises that are using B2B systems, to both send and receive orders hold less stock levels, suggesting benefits from integration of business processes. Archer and Yuan (2000) mentioned in their study that performance approaches such as rapid data exchange, low inventories and accurate quick response time. All these require a high degree of interaction and some degree of system integration between enterprise and TPs. On the other hand, despite the conditions being different for SMEs, these enterprises can still use B2B systems to manage their business and facilitate contacting

suppliers (Shaw & Subramanian, 2002). Further, some of enterprise managers believed that their enterprises were performing better because of networks and web-based transactions. Others did not mention any changes in the enterprise's financial performance. The spread of B2B systems in various economic sectors is related to the modern enterprise characteristics such as large and constantly growing competition, decreasing variety of competitive advantages, durable treatment of profit, as the result of cost reduction. Wu et al. (2003) asserted that adopting Web technology is an innovation that affects enterprise performance. Hence, the performance of the enterprise will perhaps be improved through the improvement of the tasks' efficiency as B2B systems shorten the time of trading and management. In addition, performance will increase, as the response of the executed tasks will be higher through the use of faster and more technological tools (Wu et al., 2003). The reasons of B2B system adoption in these two categories (small and medium size) of enterprises are dependent on the attitudes of their management to adopt such kind of B2B systems and its efficiency to improve business. In other words, this can be reflected through the value of IT for the SMEs (Davern & Kauffman, 2000; Hitt & Brynjolfsson, 1996; Sircar et al., 2000). This indicates that the influence of B2B systems on one business depends on the management of SMEs. In addition, the efficiency of business can be increased as the efficiency of information transfer increases through the same enterprise and the other enterprises (Zhu 2004). This will help to improve the processing efficiency for most operations inside the enterprise (Gulati 2000).

B2B systems are treated as one of the most important actions in the global economy during previous years and associated with the emergence of increase

productivity, cost decrease and efficiency growth. Kim et al. (2006) asserted that there were positive associations between multi activities on web based transactions and overall performance, between enterprise and TPs, and between the frequency of Web and networks updates and overall performance. Adoption of B2B systems can improve the enterprise's overall performance level both within the enterprise itself and amongst its TPs (Auger & Gallagher, 1997). Therefore, adopting B2B systems should greatly benefit any enterprise, no matter what its size (Tang et al., 2004). Several studies have also found that B2B systems give the opportunity to secure short transactions time for messages, high data quality, and integration of data (Mclover & Humphreys, 2000). Gulati (2000) asserted in his study that B2B system adoption by large enterprises may improve the performance and efficiency of process, reduce product cost, improve information, reduce rogue purchases, streamline supply chain and improve service.

Costs will be affected through eliminating data entry labour costs, reducing the costs of processing and resolving errors, providing more timely information to facilitate early intervention and lower-cost resolution of supply chain problems, providing more complete information for cost-effective supply, chain planning and execution and enabling visibility of shipments to make it possible to shift to lower-cost transportation modes with a managed approach to eliminating out-of-stock conditions by expediting shipments only when necessary (Business Integration Technology Inc 2007).

These improvements can be performed perfectly in large enterprises, but in SMEs their use depends on the concepts applied for these categories (Bendoly & Schoenherr, 2005). The world is experiencing a B2B systems knowledge revolution that is fundamentally transforming the way in which enterprises in both private and public

sectors and also government's officials units operate and interact (Business Integration Technology Inc 2007).

Nurmilaakso and Kotinuemi (2004) found that B2B systems have sharply driven down businesses operating costs and are allowing SMEs to compete on an even basis with large firms in B2B systems applications through Web-based usage. According to Lucking and Spulber (2001) prospects about efficiency achieved from B2B system adoption can be helpfully divided into four areas: Possible efficiencies from automation of transactions; prospective economic advantages of new market intermediaries; consolidation of demand and supply through structured exchanges; and changes in the degree of vertical integration of enterprises. The extent of improving performance and efficiency of enterprise will depend on the type of technology and the enterprise concern for IT applications such as B2B systems (Hemphill 2004).

The high concern of the enterprise to provide integrated infrastructure and IT personnel will insure good outcomes. Hemphill (2004) explains that the culture should allow changes to allow integrated application of B2B systems. Lee (2002) added that the biggest challenge to SMEs is not to find best B2B systems process and model but to change the approach of the owners themselves. MacGregor (2004) noted that for those who have developed an enterprise-wide strategy, these changes could lead to an increase in efficiency in the business. However, for those who have not, this can reduce the flexibility of the business. Davies (2003) concludes with the fact that the improvement in performance and efficiency is the main reason for B2B system adoption in SMEs' sector. The following Table 3.14 describes the drivers identified by Davies to adopt B2B systems in SMEs.

Table 3.14

Drivers to Adopt B2B Systems in SMEs

Drivers to adopt B2B	Percentage of respondent %
Improve performance & efficiency	28
Increase turnover	22
Stay ahead of competitors	21
Customers/trading partners pressure	14
Develop new products or services	12
Enable collaboration	6
Follow the trend	5
Suppliers pressure	5

Source: (Davies 2003)

Business Integration Technology Inc (2007) as a leading B2B systems integration consultant illustrated that the B2B systems can reduce costs by eliminating data entry labor costs, reducing the costs of processing and resolving errors and providing more timely information and lower-cost resolution of supply chain problems. The extent of improvement in performance and efficiency of the enterprise will depend on the type of technology and the enterprise's concern for IT (Titi 2005). The high concern of the enterprise to provide integrated infrastructure and IT could ensure good outcomes and profits (Yau 2002). Hemphill (2004) explained that the culture of enterprise should allow changes to allow integrated application of B2B systems. Therefore, the literature indicates that the efficiency and performance of the enterprise can be improved through the use of B2B systems, but the extent of improvements will depend on the enterprise itself and its tendency to use B2B systems. Hence, the current research will investigate the readiness of SMEs in Amman to adopt B2B systems and the extent of improvement concerning their performance and efficiency.

3. 12 Proposed Research Model

Based on the literature this research develops a model and discusses the various factors that might have significant contributions to B2B system adoption in SMEs in Amman. The research model in this study is very broad and covers issues and factors that are associated with B2B system adoption in SMEs in Amman and its influence on their performance and efficiency. The current proposed research model has been developed from three previous models mentioned in section 3.8. Hence, this research depends on Venkatesh et al. (2003), Bradford and Florin (2003) and Iacovou et al. (1995) to study the factors that influence the adoption of B2B systems in SMEs in Amman and its influence on their performance and efficiency. The research questions will be answered by using Structural Equation Model (SEM) (Kline 2005). The proposed research model also is tested as part of the Confirmatory Factor Analysis (CFA) (Moore 2004). As shown in the proposed research model in Figure 3.5 and described in Table 3.15 there are 13 factors included in this research.

The first of these factors are internal organisational factors, which include two factors:

1- The SME's strategic in practicing B2B systems. This factor is measured by the enterprise's infrastructure of ICT, practice and trust of B2B systems and the size of the enterprise.

2- The perceptions and experience of SME managers in B2B systems are considered as another internal organisational factor and measured by the knowledge and awareness of SME managers of IT and IS and IT skills of managers and IT staff.

The second factor is the external organisational factors, which include two factors:

1- The readiness of local and global TPs to adopt B2B systems. Enterprise readiness for B2B system adoption refers to the level of two resources. First, financial readiness, which refers to availability of financial resources to pay for B2B system adoption costs, use of any subsequent enhancement, and ongoing expenses such as communications charges and usage fees. Iacovou et al. (1995) considered this factor because SMEs lack the financial resources necessary for B2B systems and other IT investments.

Second, technological readiness, which is concerned with the level of IT usage and IT management in an enterprise. In addition, Iacovou et al. (1995) noted that the low level of computerisation in SMEs make adoption and implementing of sophisticated IT and IS applications, difficult, requiring costly expenditures in capital, people, and technology. Hence, SMEs with highly integrated and computerized process were better prepared to undertake adopted B2B systems.

2- The external pressure by local and global TPs on SMEs in Amman to adopt B2B systems. The external pressure to adopt B2B systems in SMEs comes from two main sources; competitive pressure and pressure by TPs. As more TPs become B2B systems adopters, SMEs would be more inclined to adopt B2B systems in order to maintain their own competitive position.

The third factor is the extent of B2B system adoption. The current research recognizes the importance of various factors to measure the extent of B2B system adoption in SMEs in Amman. It is measured in terms of two factors:

1- Frequency of e-transactions. The frequency of e-transactions is defined from the range of communications between employees online to reporting and reviewing internal accounting online. In addition, is defined as how the enterprise accesses and collects feedback from counterparts online, and explores how the enterprise performs purchase transactions with its counterparts. Straub et al. (2003) noted that enterprises that adopt B2B systems can be categorised into two groups. The first group is comprised of enterprises that conduct (100%) of transactions and information sharing online. These enterprises operate through Internet, i.e., conduct on-line marketing, procurement and communication functions (Grover & Saeed, 2004). The second group is based on the percentage of e-transactions, as comprised of enterprises that conduct less than (100%) of their transactions and information sharing through Internet. These enterprises conduct activities and functions through B2B systems as well as through traditional channels, such as salespeople, telephones, facsimile and physical locations.

2- The extent of B2B system adoption and practice by local and global TPs. The extent of B2B system adoption by TPs is measures by how TPs communicate with SMEs. Further, it is measured by checking TPs products and services information are available online. Hence, both factors are important in measuring the extent of B2B system adoption in SMEs in Amman. Further, complete B2B system adoption occurs when both factors are at high adoption levels.

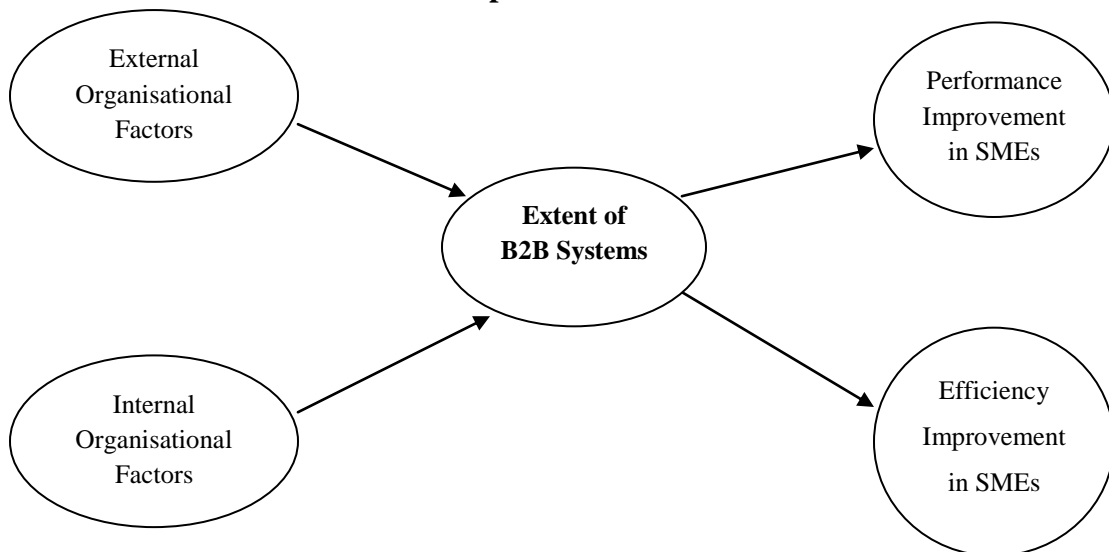
The fourth factor included in this model is covering the perceptions of SME managers in Amman about the improvements in performance as a result of adoption of B2B systems. This research explores perceptions of SME managers about improvements in performance that is measured by four factors:

- 1- Productivity
- 2- Sales
- 3- Profitability, and
- 4- Costs

The fifth factor explores the perceptions of SME managers about the improvements in efficiency as a result of adoption of B2B systems and is measured by three factors:

- 1- Operation efficiency
- 2- Inventory management and control, and
- 3- Procurement business process.

Figure 3.5
Proposed Research Model



Source: Developed for this research

Table 3.15 shows the detailed of the factors descriptions are included in the research measurement model.

Table 3.15
Factors Descriptions of Proposed Research Model

Factors	
Internal Organisational Factors	SMEs' strategic in practicing B2B Systems
	The perception of SME managers in B2B Systems
External Organisational Factors	Readiness of local and global TPs
	External pressure by local and global TPs
Extent of B2B Adoption	Frequency of e-transactions
	Extent of practicing B2B Systems with local and global TPs
Improvement in Performance in SMEs	Productivity
	Sales
	Profitability
	Costs
Improvement in Efficiency in SMEs	Operation efficiency
	Inventory management and control
	Procurement business process

Source: Developed for this research

3.13 Summary of Chapter

The review of the literature yields seemingly mixed views on the effects of the B2B system adoption on SMEs' performance and efficiency improvement. The evidence suggests that the adoption of the B2B systems in SMEs has a greater impact on the SMEs' performance and efficiency than other applications of EC systems such as B2C and B2G systems because B2B systems comprise the largest share of EC systems volume. Previous studies mentioned in this chapter have more or less failed to identify the factors and measurement variables that were most important for success B2B system adoption and whether the benefits were achieved directly or through some other

mediating factors. In this Chapter the review of the literature of the B2B system adoption demonstrated that no single definition recognised all factors which important to B2B system adoption by SMEs. This Chapter also concluded that the literature is unclear on whether B2B system adoption directly improves the SMEs performance or if these improvements are realised through some form of mediation factor such as improvement in efficiency. The current literature in this research mentions several possible moderating the effects of the B2B system adoption on SMEs performance and efficiency. These include attributes of the systems itself such as the volume and the type of information shared, whether the B2B systems is Internet-based, the length of the time of the B2B systems has been used, whether the B2B systems is used to purchase direct or indirect products and services and whether the participants were buyers, sellers (TPs) or intermediaries. The literature also mentions that attributes of the SMEs moderated the effects of the B2B system adoption on the improvement in performance and efficiency. Exploratory researches in this literature have suggested that SMEs efficiency's factors will be directly improved through the adoption of B2B systems; therefore, mediate the effect of the B2B system adoption on the SMEs' performance. However, this theory has not been empirically examined in a large-scale survey in SME sector in Amman.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction and Research Purpose

In the previous Chapter an extensive review of the literature involving the immediate disciplines of B2B systems, as well as the focus topic of this research ‘the B2B system adoption in SMEs in Amman and the perceptions of its influence on performance and efficiency’ and some other relevant topics also were conducted. This has helped to establish the importance of the research objectives for this paper and lead to the development of specific hypotheses. This Chapter describes and justifies the methodology selected to collect and analyse the data to address the research objectives and test the underlying hypotheses. As was stated in the literature review in the previous chapter, most of the researches on B2B system adoption and the influence on performance and efficiency were conducted in developed countries. This lack of relevant discourages the use of existing construct and their factors and measurement variables for the purpose of this research.

A methodology is a collection of procedures, techniques, tools and documentations aids. It is usually based on some philosophical view; otherwise, it is merely a method, like a recipe (Avison & Fitzgerald, 2003). Guba and Lincoln (1994) identified four competing models in informing and guiding research inquiry and analysis: Positivism, post-positivism, critical theory and constructivism. Undoubtedly, the positivist and post-positivist methods provide the backdrop against which other methods operate. Conventional positivist social sciences applies four criteria to

disciplined research inquiry: (1) internal validity, the degree to which findings correctly map the phenomenon in question; (2) external validity, the degree to which findings can be generalised to other settings similar to the one in which the study occurred; (3) reliability, the extent to which findings can be replicated, or reproduced by another inquirer, and (4) objectivity, the extent to which findings are free from bias. Post-positivism represents efforts of the past years to respond in a limited way to the most problematic criticisms of positivism (Guba & Lincoln, 1994).

IT and IS research is increasingly viewed as a social science that seeks to explain the effects of technology such as B2B systems on individuals, groups, and enterprises, and establish the standard for effective development, adoption and use of such technologies (Lee 2002). While the current research investigates the relationship and influence of IT and IS such as B2B system adoption and the performance and efficiency of SMEs in Amman, the researcher adopts a positivist philosophy, reflected in the objectives of the current research attempting to measure social reality and subject it to address the research objectives and hypothesis testing (Trauth & Jessup, 2000).

The power of positivism philosophy in IS and IT disciplines have direct implications for aspects of the application of adoption of technologies such as B2B systems. Useful characteristics of the positivism philosophy of the IS research include a focus on the need for good tools and methods that can be maintained against the imperfection of the human mind. Further, the understanding of positivism has developed through a process of formal testing in an objective way by the researcher. The purpose of any research is to gain and analyse information and to increase knowledge, the basis

of which could help to answer or clarify research questions, in order to support decision making such as whether to adopt B2B systems or not.

To the author's knowledge, there has been to date no systematic examination of B2B system adoption in SMEs in Amman in the industrial and service sectors. There is also no clear documentation of how the adoption of B2B systems affect or have affected the performance and efficiency in SMEs in Amman. The main aim of this Chapter is to present an outline of how the research was carried out in order to reach the defined purpose of the research. This chapter also presents a description of the study stages, approaches and methods and justifies the selection of the chosen methodology. When dealing with study problems, researchers can use one of the three following categorisations of study; exploratory, explanatory and descriptive (Yin 1994);

The first technique, an exploratory study, is often conducted when the problem of study is not well known or/and has not been clearly defined yet. The exploratory technique also helps to conclude the best study design, data collection method and selection of subjects, and sometimes it even determines that the research problem does not exist. Yin (1994) added that exploratory study is quiet informal, when it is relying on secondary data such as reviewing available literature, or qualitative approaches such as informal discussion with decision makers, top management, employees, TPs and competitors. On the other hand, there are exploratory formal approach tools such as in-depth interviews, focus groups, surveys, projective methods and case studies.

The second technique, explanatory study is to understand the character and mechanisms of relationships between the independent and dependent factors. Zikmund

(1994) noted that explanatory technique is good to use when there is no clear vision of what model should be used and what qualities and relations are significant.

The third technique, descriptive study is used to collect information concerning the status of the observable fact to describe factors or conditions in a situation. It also presents the statistical calculations such as determining the average number of occurrences (Yin 1994). Therefore, the current research mainly used both exploratory and explanatory techniques to explore the influence of the B2B system adoption by SMEs in Amman on their performance and efficiency, which the data collected through structured questionnaires and conducted interviews. It is also because the current research investigates the mechanisms and relationships between the independent and dependent factors in relation to B2B system adoption in SMEs in Amman.

For the purpose of clarity, the research structural and measurement model is shown in Figure 4.1. The factors are described in Table 4.1.

Figure 4.1
Research Measurement Model

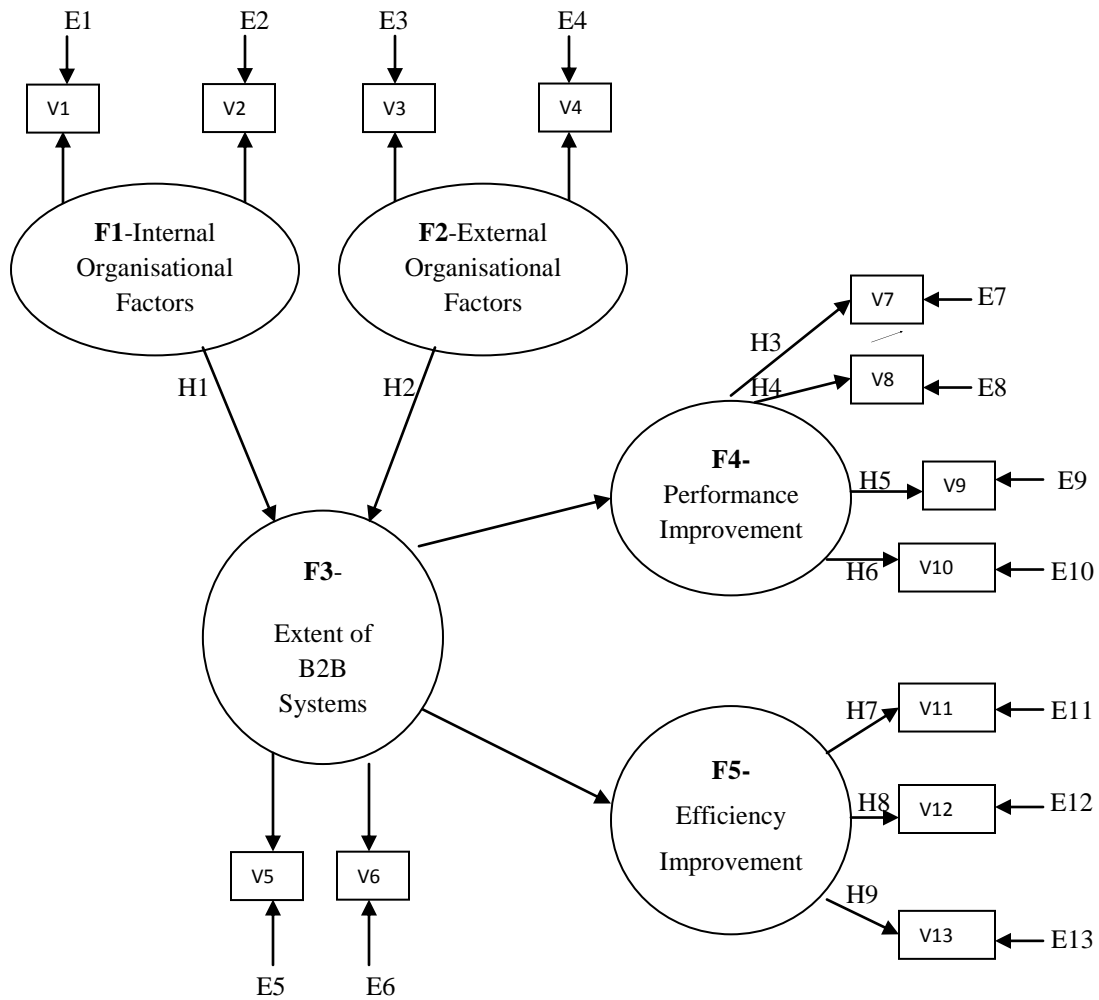


Table 4.1
Factors Descriptions – First and Second – Order Factors

First-Order Factors		Second-Order Factors
SMEs' Strategic in Practicing B2B Systems	Internal Organizational Factors	Extent of B2B System Adoption
Perceptions of SME Managers	"	"
Readiness of TPs	External Organisational Factors	"
External Pressure by TPs	"	"
Frequency of e-transactions	Extent of B2B systems	"
Practicing B2B Systems with TPs		"
Productivity	Performance Improvement	Not applicable
Sales	"	Not applicable
Profitability	"	Not applicable
Costs	"	Not applicable
Operation Efficiency	Efficiency Improvement	Not applicable
Inventory Management & Control	"	Not applicable
Procurement Business Process	"	Not applicable

4.2 Research Hypotheses

The proposed relationships in the research measurement model are tested through hypotheses H1-H9. The research measurement model explored the relationships between factors. The research questions are answered using SEM and the research measurement model is tested using CFA.

The purpose of B2B systems is to provide managers with better control over their enterprise functions and activities and their relationships with local and global TPs (Akoh 2001). Therefore, one of the aims of this research is to investigate the internal and

external organisational factors that influence adoption of B2B systems in SMEs in Amman. Hence, the following hypotheses are proposed:

H1o: there is no relationship between the internal organisational factors and the adoption of B2B systems in SMEs.

H2o: there is no relationship between the external organisational factors and the adoption of B2B systems in SMEs.

In the literature on enterprise's performance, it is well accepted that the alignment between production or distribution capabilities and market requirements and needs is one of the major keys to enterprises' performance. SMEs should provide their TPs with timely and accurate information regarding feedback from their final customers about their experiences with the products or services, quality problems, and performance of their products or services in relation to the competition. Meanwhile, TPs-SME relationships are becoming adapted with the emphasis on reducing the number of TPs and the costs. The following hypotheses propose a relationship between adoption of B2B systems in SMEs and the perceptions of SME managers of enterprise performance, measured in terms of productivity, sales, profitability and costs:

H3o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of productivity.

H4o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of sales.

H5o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of profitability.

H6o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of costs.

Essentially, the next hypotheses propose a relationship between adoption of B2B systems in SMEs, and the perceptions of SME managers of efficiency, measured in term of improvements in operation efficiency, inventory management and control and PBP (Iyer et al., 2004). It is claimed that B2B systems-based communications and functions, activities and procedures between SMEs and TPs can improve inventory management and control as well as reduce costs for all participants (Tang et al., 2004). Hence, in order to test the relationship between the adoption of B2B systems in SMEs in Amman and their efficiency, the following hypotheses are proposed:

H7o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of operation efficiency.

H8o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of inventory management and control.

H9o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of procurement business process.

4.3 Research Approaches

There are two basic types of research approaches. First, qualitative approach is focused on describing an event with the use of words. Yin (1994) shows that the qualitative approach can be applied using several strategies including case study, experiments, interview, and analysis of literature review. The qualitative approach such as an

interview is preferred when a study aims to place participants in the role of decision-makers, asking them to distinguish relevant from insignificant facts, to identify alternatives among several issues competing for attention, and formulate strategies and recommendations (Yin 1994).

A second research approach to consider is referred to as quantitative. In this type of research approach, results are based on numbers and statistics that are presented in tables, and figures. The current research used one of the quantitative research techniques for data collection, which information is collected by questionnaires with a large number of respondents using a pre-designed and tested survey (Zikmund 1994). In addition, usually, the sample of study is large enough to allow wide statistical analysis. Furthermore, quantitative analysis may be primarily concerned with relationships between factors.

The current research of B2B system adoption in SMEs in Amman is not very extensive when applied to discuss the benefits and influencing factors. Thus, to gain deeper understanding of the related aspects in the Jordanian context, this current research is conducted with both qualitative and quantitative approaches to explore the awareness and adoption of B2B systems in SMEs in Amman and examine the influence on its performance and efficiency. The current research is conducted in four procedures.

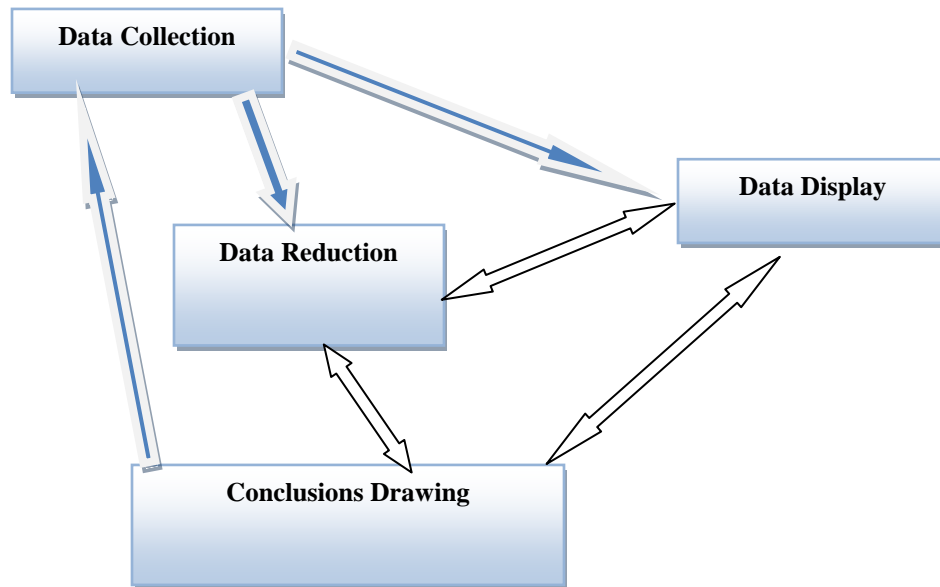
The first procedure is the literature review. The main purpose of this procedure examines the findings of other researchers and authors who have extensive experience in B2B system adoption. This procedure of research addresses a number of different issues concerned with SMEs analysis and identifies internal and external organisational factors that influence the adoption of B2B systems in SMEs.

The second procedure is the qualitative approach. A variety of qualitative methods can be used for exploratory purposes. These methods are less structured and more intensive than standardised questionnaire based interviews and result in context specific information, which is directly relevant to attitudes, rather than remote from actual behaviour (Johansson & Nonaka 1987). In this research, interview method was used for exploratory purposes. The interview is the preferred methodological tool of the qualitative approach. The main purpose of the interview is to gain insights by listening to a group of people from the appropriate respondents about the issues of interest to the research. During these interviews, participants were encouraged to describe and express their perspectives and give explanations about their perceptions of issues of interest to this research. The recorded information from ten interviews were coded and classified for qualitative analysis. Findings of these interviews were quite important to refine and further develop the constructs and identified the factors, and questionnaire items making them more relevant for SMEs in Amman.

The second procedure also depends on interviewing the general managers, directors and/or owners of SMEs in Amman as a pilot study testing the validity of questionnaire. The interviews aim to verify that identified factors in the first procedure are relevant. This stage provided a background of ICT in Jordan. It is also provides a definition of B2B systems in terms of its theoretical link with enterprises' functions, activities and procedures. In addition, the benefits and barriers relevant to B2B system adoption by SMEs are explored and the influence on its performance and efficiency. Miles and Huberman (1994) defined the qualitative data analysis, which contains three

linked sub processes: data reduction, data display and conclusion/verification. Following Figure 4.2 shows the qualitative data analysis process.

Figure 4.2
Qualitative Data Analysis Process



Source: Miles & Huberman (1994)

In order to make sure that true related data gleaned from a qualitative approach, such as interviews and the data, actually served the purpose of research or measured the proposed hypothesis and research's questions, the following measurements were taken:

First, regards to validity, the selected literature review was important as a lot of questions in the interview were derived from articles and books dealing with the subjects in interest. Hence, the previous studies were chosen carefully.

Secondly, the questions in the interview were mainly closed questions in order to make possible the later comparison of the answers but always with the opportunity to add descriptive comments and explanations. Furthermore, the interviewees were asked to verify their answers and double-checked that they had not left out any relevant data.

The third procedure is the triangulation and quantitative approach. The term most often used in connection with analysis and confirmation issues is triangulation. The use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question. Objective reality can never be captured. Triangulation is not a tool or strategy of validation, but an alternative to validation (Denzin 1989). The combination of multiple methods, empirical materials, perspectives and observers in a single study is best understood, then as a strategy that adds rigor, breadth and depth to any investigation (Flick 1992). Hence, in this research, quantitative approach was carried out to complement and validate the constructs developed and redefined through the qualitative approach. The limitations of the qualitative approach are: (i) the results are not necessarily representative of what would be found in the population and hence, are not projectable; (ii) there is typically ambiguity in the results (Flick 1992). In view of these shortcomings, findings through the qualitative approach were followed-up by quantitative approach. In this research, the following processes for multi-item measurement scales were followed and third step was supplemented with CFA:

1. Defining theoretical constructs.
2. Generating a list of items, and factors from literature and/or qualitative approach that relate to these constructs.
3. Purifying these measures using exploratory factor analysis

This procedure includes a survey of a sample of managers representing SMEs in Amman. The questionnaire referenced in this research was used to explore the perceptions and the awareness of SME managers about the adoption of B2B systems in

SMEs in Amman and to examine its influence on their performance and efficiency. Also the purpose of the questionnaire is to produce quantitative descriptions of some aspects and issues of the study population.

The questionnaire was developed based on the literature review and refined with results from the interviews and information collected from the previous procedures of the research. The questionnaire focuses on the relationship between the adoption of B2B systems in SMEs in both industrial and services sectors in Amman and the perceptions of SME managers of performance and efficiency. Therefore, in reviewing previous studies, the current study has built upon progress made elsewhere, both in influential factors of B2B system adoption and in the analysis of collected data from resulting questionnaire and interviews. The questionnaire was pre-tested for its validity and reliability. A pilot test conducted to check the validity of the questionnaire, eliminate any uncertainty and make appropriate changes according to respondent's suggestions.

The sample in this research is selected as a stratified random sample. The minimum number size of sample (SS) will be determined using the following equation:

$$SS = Z^2 * (P) * (1-P) / C^2$$

Where:

Z = value (e.g. 1.96 for 95% confidence level)

P = percentage picking a choice, expressed as decimal (0.5 used for sample size needed)

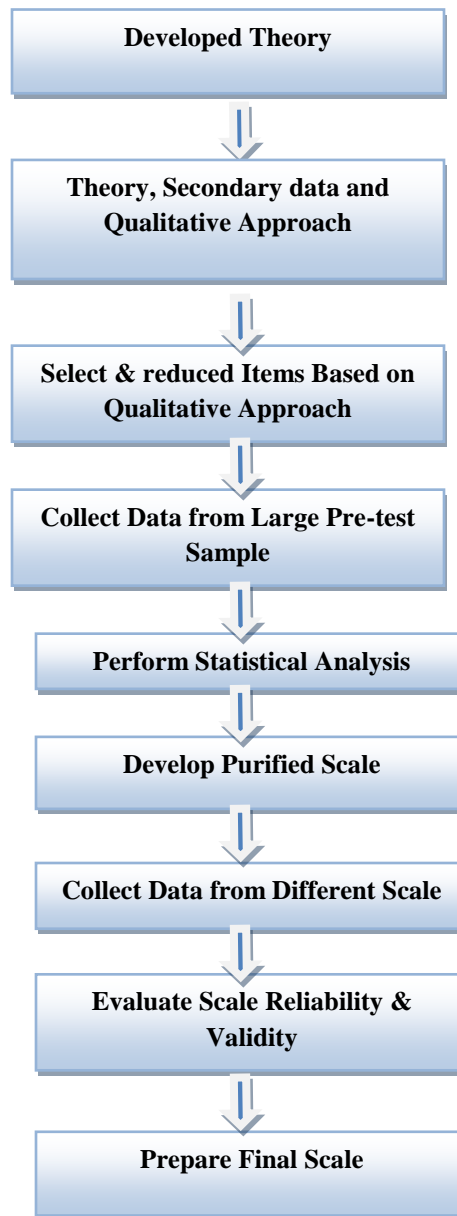
C = confidence interval, expressed as decimal (e.g., .04 = ±4).

The percentage of the Internet users (SMEs in Amman) will be used as criteria to select the sample size. The percentage of Internet users is 4.7%. Hence, the minimum

sample size will be: $SS = (1.96) (99.95) (0.047)/0.05 = 184.1$. This means that the minimum number of sample to cover the population is 184 SMEs. To get more distribution over SMEs in Amman, the number of sample will be increased to reach 500 SMEs in both industrial and services sectors. The appropriate sample size can increase generalisability and reduce sampling errors. Gay and Airasian (2000) suggested that if the population is over 5,000, a sample size of 400 should be adequate. Ethics clearance was approved in February 2009 from the USQ Human Research Ethics Committee. The ethics clearance approval is included in Appendix F.

The fourth procedure is the data coding and analysis. This procedure includes presentation, hypothesis testing and analysis of results. Various quantitative statistics of methods such as factor analysis, t-test, analysis of variance and correlation were employed on the interview and questionnaire data. SEM conducted to examine the hypothesised relationships between factors and lower and higher influence factors (Moore 2004). 'SPSS v17' will be used to evaluate and perform all the analysis to test the hypotheses. Furthermore, this research will use content analysis of interview transcripts to identify important themes. The results in terms of rejecting or accepting the hypothesis, tests were conducted to compute the probability values (P). P values measure the extent to which the test statistics disagree with the null hypothesis. Following Figure 4.3 shows the development of triangulation scale.

Figure 4.3
Development of Multi-item (Triangulation) Scale



Source: (Malhotra 2003)

4.4 Data Collection Methods

Saunders et al. (2000) proposed that data collection method is highly influenced by the methodology that is chosen. Therefore, in the current research, two methods are used for data collection. The procedures used for each of these data collection methods are described next.

The primary data is collected through the ten interviews that will be conducted with selected managers and owners of SMEs in both industrial and service sectors in Amman. The interview is used to ensure the content of the proposed survey accurately reflects the issues of interest to the enterprise and that the questions are asked using expressions that are consistent with that used by the population answering it. Primary data is also collected via the survey, which is prepared for the purposes of this research. Survey builds as many relationships as possible between B2B system adoption, perceptions of performance and efficiency in SMEs and research measurement model by using statistical analysis. The secondary data is obtained through the collection of related literature to represent the extent of ICT and B2B system adoption by SMEs, particularly in developing countries such as Jordan (Amman City).

The research questions, hypothesis, factors and data collection of research are described in the following Table 4.2.

Table 4.2
Research Questions, Hypotheses, Factors and Data Collection

Research Questions	Hypotheses	Factors	Data Collection
<p>Q1: What are the perceptions and experience of SME managers in Amman of information communication technology (ICT), and business-to-business (B2B)?</p>	<p>H1o: there is no relationship between the internal organisational factors and the adoption of B2B systems in SMEs.</p>	<p>Internal organisational factors;</p> <ul style="list-style-type: none"> - SMEs' strategic in practicing B2B. - Perceptions of SME managers. 	<p>Interview; Items 1-12</p> <p>Questionnaire; Items 1 – 16 Items 17 - 28</p>
<p>Q2: What is the readiness of local and global trading partners and SMEs in Amman to adopt and business-to-business (B2B)?</p> <p>Q3: Are SMEs in Amman pressured to adopt B2B systems by local and global trading partners who adopt B2B systems?</p>	<p>H2o: there is no relationship between the external organisational factors and the adoption of B2B systems in SMEs.</p>	<p>External organisational factors;</p> <ul style="list-style-type: none"> - Readiness of local and global TPs. - External pressure by local and global TPs. 	<p>Interview; Items 21-22</p> <p>Questionnaire; Items 29 – 33 Items 19,34 - 42</p>
<p>Q4: Do SME managers in Amman perceive that performance has improved since adopting B2B systems?</p>	<p>H3o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of productivity.</p> <p>H4o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of sales.</p> <p>H5o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of profitability.</p> <p>H6o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of costs.</p>	<p>Extent of B2B system adoption in SMEs in Amman;</p> <ul style="list-style-type: none"> - Frequency of e-transactions - Practicing of B2B systems. <p>Performance Improvement in SMEs in Amman;</p> <ul style="list-style-type: none"> - Productivity - Sales - Profitability - Costs 	<p>Interview; Items 6, 8, 12-13, 15-16 and 18</p> <p>Questionnaire; Items 43 – 47 Items 48 – 53</p> <p>Questionnaire; Items 54 - 65</p>

<p>Q5: Do SME managers in Amman perceive that efficiency has improved since adopting B2B systems?</p>	<p>H7o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of operation efficiency.</p> <p>H8o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of inventory management and control.</p> <p>H9o: there is no relationship between the adoption of B2B systems and the perceptions of SME managers of procurement business procedure.</p>	<p>Extent of B2B system adoption in SMEs in Amman.</p> <p>Efficiency Improvement in SMEs in Amman;</p> <ul style="list-style-type: none"> - Operation efficiency - Inventory management and control - PBP 	<p>Interview; Items 6, 8, 12-13, ,15 and 17-19</p> <p>Questionnaire; Items 66 - 75</p>
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Source: Developed for this research

4.5 Population and Sampling Frame

Saunders et al. (2000) mentioned that there are two techniques used for sampling. First with the probability sampling technique, the sample is selected in such a way that each participant within the population has a known chance of being selected. The population sampling probability technique includes random sampling, systematic sampling and stratified sampling. Second, in non-probability sampling, the sample is selected in such a way that the chance of being selected of each participant within the population is unknown. Non-probability techniques include convenience sampling, judgment sampling, quota sampling and snowball sampling. Saunders et al. (2000) noted that the non-probability sampling technique is used during introduction research efforts to get a gross estimate of the results, without incurring the cost or time required to select random sample. Further, while non-probability sampling techniques can dramatically lower

costs, it comes at the expenses of introducing bias because the non-probability technique itself reduces the probability that the sample represents a good cross section from the population. Therefore, the non-probability sampling was chosen for this current research because the study targeted several groups and sectors in the Jordanian context. In addition, in this type of sampling technique, the researcher must be certain that the chosen sample is truly representative of the entire population. In this research all Jordanian SMEs are the total population and 500 SMEs in Amman in both industrial and services sectors have been chosen as the sample of the study.

Sampling is important if budget and time restrictions prevent the study from surveying the whole population. Sampling also gives higher accuracy and faster results. The population in the current research consists of SMEs in both industrial and service sectors in Jordan. The SMEs in Jordan represent different industries and services enterprises such as marketing, computer software/hardware, chemicals, consultants etc. A small, but carefully chosen sample used to represent the population. Given the large population of the study, a stratified random sample of SMEs in the capital city Amman has been taken. Therefore, in this research all Jordanian SMEs comprise the total population, 500 SMEs in Amman from the industrial and services sectors have been chosen as a sample. The sample of SMEs in Amman in this research are stratified randomly selected from the population of SMEs in Amman accessed through the Annual Handbook Index (2008) compiled by the Jordanian Chamber of Commerce (JCC) (MIT 2008).

The advantage of this handbook index in Jordan is that it provides the industry type, enterprise size, enterprise activity, contact information, and geographical location

of most of the SMEs. Potential respondents from SMEs sample are screened for qualification in this research. Qualifications are based on whether a SME uses B2B systems by asking the manager about the way enterprise uses the Internet to conduct information sharing and transactions with TPs. By doing this, the stratified random sample includes 4 groups classified in the following Table 4.3.

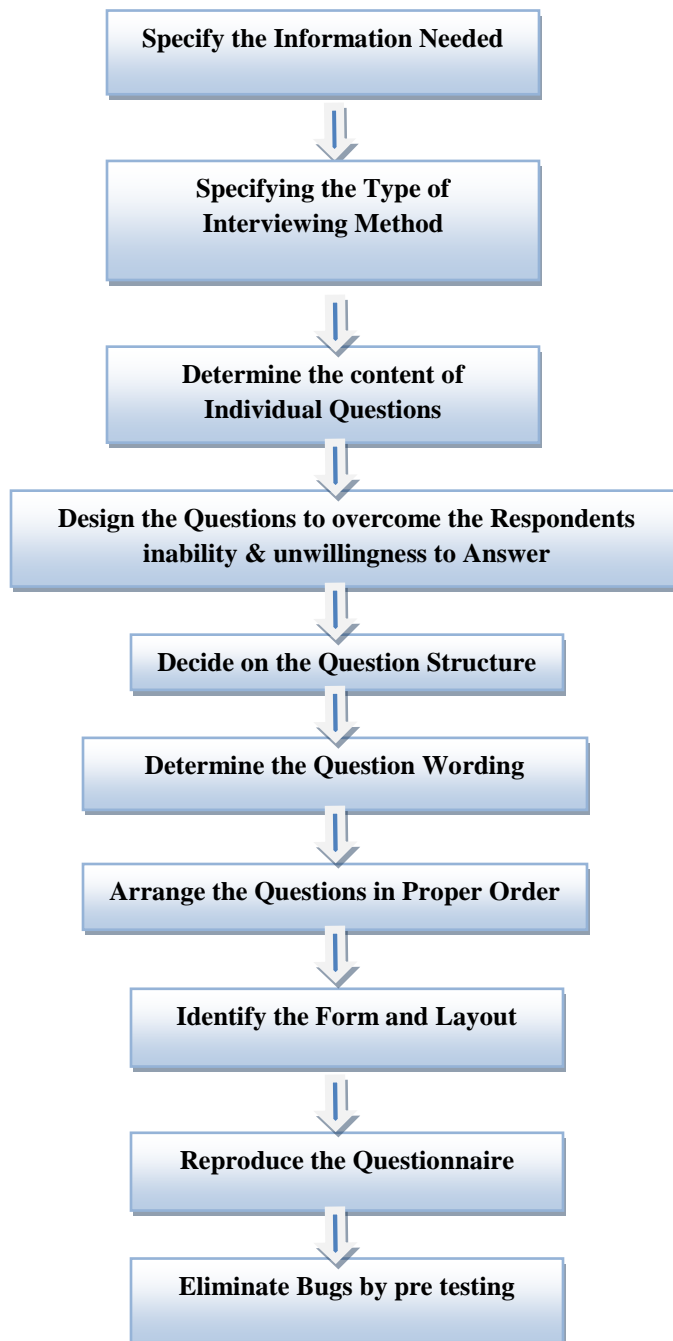
Table 4.3
The Sample Proportions

Size / Sector	Services	Industrial	Total
Small	250	150	400
Medium	50	50	100
Total	300	200	500

4.6 The Questionnaire

To collect the quantitative primary data, this research designed a questionnaire that translates the information needed into a set of specific questions; motivates respondents to complete the questionnaire and minimises response error. Figure 4.4 presents the questionnaire design process used in this research.

Figure 4.4
Questionnaire Design Process



Source: (Malhorta 2003)

To collect the data, 500 SMEs in Amman were given a hand-delivered questionnaire. In this current research, the questionnaire is the tool used to collect quantitative data about the adoption of B2B systems in SMEs in the industrial and services sectors in Amman, and its influence on performance and efficiency. The SME owner/manager is the unit of analysis as this is the person who is the decision maker. An 8-page questionnaire consisting of three parts was developed. The first part was designed to collect data based upon on the experience of enterprise in the areas where it operates, activities of the enterprise and the number of employees. The questions in the first part are designed as control variables to test whether the effects of B2B systems are contingent on enterprise size, B2B systems use duration and enterprise sector.

The second part collects information and measures the degree to which B2B systems are adopted in selected SMEs in both industrial and services sectors in Amman. This section also explores the perceptions of SME managers of internal and external organisational factors that may influence the adoption of B2B systems in selected SMEs. The third part explores and measures the relationship between the perceptions of SME managers of B2B system adoption and the improvements in performance and efficiency in SMEs.

Data collection using five-point Likert scales is accepted in many top journals such as MISQ Journal and The Social Sciences Journal. One of the main advantages of Likert scales is that they measure factors that are difficult to quantify, or for which respondents are unable or unwilling to give precise data. Hence the current questionnaire is structured with a five-point Likert scale, which is used to measure B2B system adoption and the perceptions of SME managers of the performance and efficiency.

The respondents were asked to indicate their perceptions of the factors on a five-point Likert scales. Survey questions were developed using a deductive approach using both the literature and subject matter experts. The revised questions were combined into the Guttman scales. The Guttman scale arranges responses so that succeeding responses encompass all of the previous responses in an item (Guttman 1944). For example, if a respondent had a choice of five responses and chose response number one, they chose only response number one. If a respondent chose response number five, they actually chose responses one to five inclusive. The survey instrument with the Guttman scales was pilot tested by ten of SME managers in Amman, using the survey procedures suggested by Dillman (2000).

As mentioned earlier in the Table 4.2, the questionnaire uses 16 items to measure the SMEs' strategic in practicing B2B systems (Q1 to Q16) and 12 to measure the perceptions of SME managers (Q17 to Q28). 5 items (Q29 to Q33) used to measure readiness of local and global TPs, 9 items (Q34 to Q42) used to measure the external pressure from local and global TPs. In addition, 5 items used to measure frequency of e-transactions (Q43 to Q47) and 6 items used to measure the extent and practicing of B2B systems with TPs (Q48 to Q53).

In the third part in the questionnaire, 3 items used to measure the effect of the B2B system adoption on productivity (Q54 to Q56), 2 items used to measure the effect of the B2B system adoption on sales (Q57 and Q58), also 2 items used to measure the effect of the B2B system adoption on profitability (Q59 and Q60) and 4 items used to measure the effect of the B2B system adoption on costs (Q61 to Q64). Question 65 used to measure the overall perceptions of SME managers of B2B system adoption on their

enterprises performance. In addition, in the same part of the questionnaire, 3 items used to measure the effect of the B2B system adoption on operation efficiency in SMEs in Amman (Q66 to 68), 3 items used to measure the effect of the B2B system adoption on inventory management and control (Q69 to Q71) and 3 items used to measure the effect of the B2B system adoption on procurement business process (Q72 to Q74). Question 75 measured the overall perceptions of SME managers of B2B system adoption on their enterprises' efficiency. A copy of the questionnaire is included Appendix A.

4.6.1 Factors Reliability

Seyal and Rahman (2007; 2003) reported in their study that the perceptions and attitudes of the enterprise managers toward B2B system adoption with Cronbach's alpha 0.76. The results of the principle components analysis and CFA of Seyal and Rahman (2007) study indicated high factor reliability in this instrument. In a study conducted by Leech et al. (2008; 2005) the Cronbach's coefficient alpha and average variance of the instrument were provided as follows:

- Performance improvements factor (costs, sales, productivity): alpha = 0.78; average variance = 0.65
- Internal and external organisational factor (perceptions, readiness and external pressure by TPs): alpha = 0.75; average variance = 0.65

In a study conducted by Wu et al. (2003) the Cronbach's coefficient alpha was provided as follows:

- The extent of B2B system adoption (Practicing B2B with TPs): alpha = 0.82.
- The extent of B2B system adoption (Frequency e-transactions): alpha = 0.75.

- Efficiency improvements factor (PBP): $\alpha = 0.77$.

Each Cronbach's coefficient alpha was above 0.70, which is sufficient on internal consistency reliability of social and business research suggested by Leech et al. (2008; 2005). Moreover, for reliability of items and factors, Wu et al. (2003) indicated that all items were subject to principle components analysis and CFA. The results showed high factors and items reliability on this questionnaire. Hence, the reliability of the questionnaire was sufficient for current research. Descriptive statistics, correlations among factors and reliability indices are calculated and reported in chapter six. Since SEM and CFA employed both the correlation and covariance matrix, each are calculated as part of the analysis in EQS v 6.1– the software used in this research.

4.6.2 The Administration and Development of Questionnaire

The first section of the survey instrument is concerned with the collection of information from a selected sample of SMEs in Amman. The questions in this part are designed to test whether the effects of the B2B systems are contingent on enterprise size, types of activity (industry), B2B system use duration, and enterprise sector. The enterprise size, enterprise activity and sector are considered as control variables of the SMEs' strategic factor that are measured in part two of this instrument.

In the second part of the questionnaire, which measures the factors that influence B2B system adoption in SMEs, the five-point Likert scales is designed in the percentage for importance of the factors. Table 4.4 shows the list of the definitions of 5 scales that used to represent the importance of each factors in relation to B2B system adoption.

Table 4.4
Definitions of the 5 Scales Used to Represent Factors that
Influence B2B System Adoption

None: means that factors and items are not affect the extent of B2B system adoption in your enterprise
< 25%: means that factors and items are affect the extent of B2B system adoption in your enterprise, but less than 25% of importance factor.
25%-50%: means that factors and items are affect the extent of B2B system adoption in your enterprise, but only 25%-50% of importance factor.
51%-70%: means that factors and items are affect the extent of B2B system adoption in your enterprise, but only 51%-70% of importance factor.
>70%: means that factors and items are affect the extent of B2B system adoption in your enterprise, and more than 70% of importance factor.

Source: Developed for this research, based on (Dillman 2000; Kline 2005; Moore 2004)

The third part of the questionnaire measures the extent of B2B system adoption in SMEs, used the following indicators and percentages, as described in Table 4.5. The questions in this part of the questionnaire evaluated the level of the B2B system adoption in SMEs by measuring the percentage of activities, which are conducted on-line.

Table 4.5
Definitions of the 5 Scales Used to Represent the Extent of B2B System Adoption

None: means that activities are not performed on-line in your enterprise.
< 25%: means that activities are performed on-line in your enterprise, but less than 25% of total activities are conducted on-line.
25%-50%: means that activities are performed on-line in your enterprise, but only 25%-50% of total activities are conducted on-line.
51%-70%: means that activities are performed on-line in your enterprise, but only 51%-70% of total activities are conducted on-line.
>70%: means that activities are performed on-line in your enterprise, and more than 70% of total activities are conducted on-line.

Source: Developed for this research, based on (Dillman 2000; Kline 2005; Moore 2004)

The second section in part three of the questionnaire seeks to discover the degree to which SME's performance and efficiency will be improved by adopting B2B systems. Thus, in this section respondents are considering the overall percentage of the changes that took place beginning in the first year of adoption through to the present period.

Table 4.6 is lists the definitions of 5 scales used to represent the percentage of the improvements in SME's performance and efficiency since B2B systems has been adopted.

Table 4.6
Definitions of the 5 Scales Used to Represent the
Improvements in Performance and Efficiency in SMEs

None = 'Did Not Change': means that B2B system adoption did not change your enterprise performance and efficiency.
<25% = 'Changed Slightly': means that B2B system adoption was used to make relatively minor changes in your enterprise performance and efficiency.
25%-50% = 'Changed Moderately': means that B2B system adoption was used to make relatively important changes in your enterprise performance and efficiency – but most of existing process was left intact.
51%-70% = 'Changed Significantly': means that B2B system adoption was used to make relatively large changes in your enterprise performance and efficiency – changing most of the existing process.
>70% = 'Changed Radically': means that B2B system adoption was used to make completely changes and re-engineer existing in your enterprise performance and efficiency.

Source: Developed for this research, based on (Dillman 2000; Kline 2005; Moore 2004)

Internal Organisational Factors

SMEs' Strategic in Practicing B2B Systems

Items 1-16 (Part Two)

Items from 1 to 16 are measuring the SMEs' strategic in practicing B2B systems, which represents the infrastructure, practicing and trust of the B2B systems. The five response scale for items 1 to 16 is 'None', <25%, 25-50%, 51-70%, 70%+. Items from 1 to 6 measure the IT and IS infrastructure in the SMEs in Amman. Items from 7 to 16 are measuring the practicing and trust of the B2B systems in SMEs in Amman. Items 7 to 16 are designed to focus the respondent on the issue of practicing B2B and how they connect with TPs.

Instruction: Please select the most appropriate response for each question. These questions evaluate the SMEs' strategic in practicing B2B systems in Amman, by measuring the percentage of IT infrastructure and the extent of practicing B2B systems in your enterprise.

Internal Organisational Factors

Perceptions of SME Managers

Items 17 - 28 (Part Two)

Items from 17 to 28 are measuring the perceptions, knowledge and attitudes of the SME managers, which represent the extent of knowledge and awareness of the SME managers about the B2B system adoption. Items also are measuring the extent of IT skills of managers and IT staff in SMEs in Amman. The five response scale for Items from 17 to 28 is 'None', <25%, 25-50%, 51-70%, 70%+. Items 17 to 23 are measuring the extent of

knowledge and awareness of the SME managers in Amman. Items from 24 to 28 are measuring the extent of IT skills of managers and IT staff in the SMEs in Amman.

Instruction: Please select the most appropriate response for each question. These questions evaluate the level of the knowledge and awareness of the SME managers to adopt B2B systems.

External Organisational Factors

Readiness of Local and Global Trading Partners

Items 29-33 (Part Two)

Items from 29 to 33 are measuring the readiness of local and global TPs, which represent the effects of this factor as one of the external organisational factors on the B2B system adoption in the SMEs in Amman. The five response scale for Items from 29 to 33 is 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please select the most appropriate response for each question. These questions evaluate the level of the readiness of local and global TPs to adopt B2B systems.

External Organisational Factors

External Pressure by Local and Global TPs

Items 34-42 (Part Two)

Items from 34 to 42 measure the external pressure by local and global TPs, which represent the effects of this factor on the B2B system adoption in SMEs in Amman. The five response scale for items from 34 to 42 is 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please select the most appropriate response for each question. These questions evaluate the level of the external pressure by local and global TPs on SMEs in Amman to adopt B2B systems.

Extent of B2B System Adoption in SMEs

Frequency of E-Transactions

Items 43-47 (Part Three)

Items from 43 to 47 are measuring the frequency of e-transactions between the SME, TPs, which represent through several dimensions and items. These dimensions and items are validating by interviews were conducted with selected SME managers in Amman. The five response scale for items 43 to 47 in this part is 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please select the most appropriate response for each question. These questions evaluate the level of the frequency of e-transactions.

Extent of B2B System Adoption in SMEs

Practicing B2B Systems by Local and Global TPs

Items 48-53 (Part Three)

Items from 48 to 53 are measuring the extent of the practicing B2B systems by local and global TPs, which represented through 6 of dimensions and items. These items were validated by interviews were conducted with the selected SME managers in Amman. The five response scale for items 48 to 53 in this part is ‘None’, <25%, 25-50%, 51-70%, 70%+.

Instruction: Please select the most appropriate response for each question. These questions evaluate the extent of practicing B2B systems by local and global TPs.

Improvements in Performance in SMEs

Productivity

Items 54-56 (Part Three)

Items from 54 to 56 measure the level of improvements in performance in the SMEs in Amman. Definitions and 5 scales have been adopted to represent the degree of the improvements in SMEs productivity since B2B systems adopted. Items 54 to 56 are test the productivity as the first factor that affected by the B2B system adoption in SMEs in Amman. Improvements in productivity in SMEs are measured using five-point Likert scale as follow: ‘None’, <25%, 25-50%, 51-70%, 70%+.

Instructions: Please select only 1 answer per question. If you do not know the answer, or cannot obtain it quickly, please do not answer the question.

Improvements in Performance in SMEs

Sales

Items 57 and 58 (Part Three)

Items 57 and 58 measure the perception of SME managers related to sales improvement as the second factor that affected by the B2B system adoption in SMEs in Amman. Sales improvement is measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please indicate the degree to which your sales improved since adoption B2B systems. Please consider the overall improvements that took place beginning in the first year of adoption through the present period. Please select the answer that most closely fits your experience.

Improvements in Performance in SMEs

Profitability

Items 59 and 60 (Part Three)

Items 59 and 60 measure the perceptions of SME managers related to increase in the profitability of their enterprises, which profitability the third factor that affected by the B2B system adoption in SMEs in Amman. Profitability improvements are measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please indicate the degree to which your profits improved since adoption B2B systems. Please consider the overall profits improvements that took place beginning in the first year of adoption through the present period. Please select the answer that most closely fits your experience.

Improvements in Performance in SMEs

Costs

Items 61 - 64 (Part Three)

Items from 61 to 64 measure the perceptions of SME managers related to increase costs saving as the last factor of performance improvements that affected by the B2B system adoption in SMEs in Amman. Reduce costs measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+. Question 65 used to measure the perceptions of SME managers of B2B system adoption on their enterprises performance.

Instruction: Please indicate the degree to which your costs reduced since adoption B2B systems. Please consider the overall costs reduced that took place beginning in the first year of adoption through the present period. Please select the answer is that most closely fits your experience.

Improvements in Efficiency in SMEs

Operation Efficiency

Items 66 - 68 (Part Three)

Items from 66 to 68 are measure the level of improvements in efficiency in the SMEs in Amman. Definitions of 5 scales have been adopted to represent the degree of the improvements in SMEs efficiency since B2B systems adopted. Items from 66 to 68 test the operation efficiency as the first factor that will be affected by adopting B2B systems in SMEs in Amman. Improvements in operation efficiency in SMEs are measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please indicate the degree to which your operation efficiency has been improved since adoption B2B systems. Please consider the overall improvements that took place beginning in the first year of adoption through the present period. Please select the answer that most closely fits your experience.

Improvements in Efficiency in SMEs

Inventory Management and Control

Items 69 - 71 (Part Three)

Items from 69 to 71 measure the level of inventory management and control as the second factor that will be affected by adopting B2B systems in SMEs. Improvements in inventory management and control in SMEs are measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+.

Instruction: Please indicate the degree to which your enterprise inventory management and control has improved since the adoption of B2B systems. Please consider the overall improvements that took place beginning in the first year of adoption through the present period. Please select the answer that most closely fits your experience.

Improvements in Efficiency in SMEs

Procurement Business Process

Items 72 - 74 (Part Three)

Items from 72 to 74 measure the level of procurement business process as the third factor that will be affected by B2B system adoption in SMEs. Improvements in procurement business process in SMEs are measured using five-point Likert scale as follow: 'None', <25%, 25-50%, 51-70%, 70%+. Question 75 used to measure the perceptions of SME managers of B2B system adoption on their enterprises efficiency.

Instruction: Please indicate the degree to which your enterprise procurement business process has been improved since adoption B2B systems. Please consider the overall improvements that took place beginning in the first year of adoption through the present period. Please select the answer that most closely fits your experience.

4.6.3 Factors and Data Analysis

In the current research the guidelines for survey instrument development, hypotheses testing and data analysis employed from Dillman (2000), were generally followed except for the initial method of contact. Instead of recruiting respondents by e-mail, in the current research, respondents are initially by hand delivered survey and face-to-face contact. Further, validating the survey shown in Appendix A is conducted using the four procedures process recommended by Dillman (2000). The questions in the survey are converted into the proposed research measurement models (Figures 3.5; 4.1). In this research, the method for factors scoring is known as 'formative variables'. The formative variables method is the process of developing factors scores by adding each

respondent's answers for a set of questions (Kline 2005). In addition, the formative variables method is in contrast to reflective factors where survey questions will be assumed to correlate, and where a reliability index will be calculated (Kline 2005; Moore 2004).

The data analysis will be estimating the reliability of the survey respondents using the survey questions and factors scores. Therefore, testing the SEM is important to formally test for the existence of the B2B systems in SME, which is a factor included in the research measurement model. In addition, SEM will be used to quantify the relationships among the factors in order to estimate the effect of B2B system adoption on performance and efficiency in SMEs. This will be accomplished through estimating structural path coefficients. Further, SEM will be used to investigate whether some factors are more influenced by B2B system adoption in SMEs. The variance of B2B systems will be fixed so that the structure coefficient on the arrows in Figure 4.1 will be freely estimated. Thus, one relationship between factors fixed in order to scale the factors, for example the relationship between the productivity and B2B system adoption.

4.7 Research Reliability and Construct Validity

Reliability of questionnaire refers to the degree to which tools of data collection will yield consistent findings, similar observations would be made or conclusions reached by other researchers or there is transparency in how sense was made from the raw data (Saunders et al., 2000). According to Saunders et al. (2000) there are four threats to reliability of researches tools, such as questionnaire and interviews. The first threat is that a questionnaire may produce different results at different times of the questionnaire

period. The second threat, related to participant bias, which is when interviewees may have been saying what they thought their managers or owners, wanted them to say. The third threat refers to observer error, that different interviewers may approach the interview and survey questions in different ways. Finally, observer bias refers to differing approaches in understanding participant's responses.

Cohen et al. (2003) defined scale reliability as an estimate of how consistent and stable an instrument measures factors of interest. They also added that inter-rater reliability refers to the degree to which multiple respondents agree or correlate on factors of interest. Hence, rater reliability refers to the degree to which a respondent answers the same way when retested using the same instrument. The current research is utilising the internal consistency method for testing scale reliability and for estimating the reliability between the examined factors.

The internal consistency method is chosen because it requires only one administration of the questionnaire and is commonly used in empirical research. Validity is used to examine whether a factor measures the construct it is designed to represent. CFA is used for estimating construct validity in this research because the evidence for the theoretical relationships between factors is suggested in the literature (Kline 2005). As suggested by Kline (2005) factors correlated less than 0.85 percent with other factors in CFA is evidence of sufficient divergence to suggest that a factor is measuring something different. CFA differs from Exploratory Factor Analysis (EFA). EFA is used to discover factors that have not been theoretically identified (Moore 2004). In a stratified random sample in this research, the non-response bias is estimated through the control variables. For example, if a specific sector in the sample is underrepresented in

the selected sample because of non-response; those responses that are received are used to estimate the bias of the sample. This research employed personal contact through hand delivered survey, which was taken four weeks to test the questionnaire with pilot study respondents and up to ten weeks to request respondents in the stratified random sample.

4.8 Response Rate and Non-Response Bias

Acceptable respondents include SME managers who indicate they have direct knowledge of the effects of B2B systems on the enterprise's performance and efficiency. Managers at this level have been shown to provide reliable results in previous studies such as Craighead and LaForge (2002) and Vehovar et al. (2001). Titles of these managers include owners, IT managers, operation managers and general managers. Dillman (2000) found that surveys conducted through personal interviews or hand delivered have response rates much higher than web-based or mail surveys because of the close contact between the researcher and respondents.

The correlation analysis in this research is necessary because the Pearson correlation coefficient and other agreement analyses are subject to respondent-scale bias (Moore 2004). In addition non-response bias is difficult to estimate because the only way to validate the results of fully convenience designs would be to get non-responders to respond. In the stratified random sample in this research, the non-response bias is estimated through the control variables. For example, if a specific sector in the sample is underrepresented in the selected sample because of non-response; those responses that are received are used to estimate the bias of the sample.

4.9 Questionnaire Analysis

The SEM is conducted on the research measurement model to test the hypothesised relationships between factors, and between lower and higher factors. SEM involves the application of several statistical techniques to examine the relationship between continuous or separate predictor factors and continuous or separate principle factors. The method combines the analytical techniques of regression and CFA to remove all of the error variance in the factors. SEM also estimates all of the relationships in the research measurement model and provides several indices of fit and non- fit using Maximum Likelihood (ML) and several fit indices based on the Chi-square statistic.

Convergent and divergent validity will be examined by comparing a single-factor model to the structural model (Second – Order Factor) using EQS Software and the ML estimation method. The first step in CFA is to relate the factors to the latent factors. This procedure assumes that a theoretical relationship already exists. The theoretical evidence for the relationships was developed from literature review discussed in Chapter Three. The software packages used in this research are ‘SPSS’ for data screening and analysis and ‘EQS’ for conducting the SEM and CFA analyses.

The structural measurements model is developed to be as simple as possible by using few proposed paths. The CFA tests whether the implied relationships in the structural research model are relevant to the observed data. SEM is used to examine the relationships between the lower and higher factors. This includes testing both direct and indirect effects in the proposed relationships. CFA is different; it is used to study the patterns of relationship among many dependent factors, with the goal of discovering something about the nature of the independent factors that affect them, even though

those independent factors were not measured directly. The purpose of CFA is to discover a simple model in the pattern of relationships among the factors. In particular, it seeks to discover if the factors and measurement variables can be explained largely or completely in terms of a much smaller number of variables called factors. CFA suggests answers to four major questions (Kline 2005):

1. How many different factors are needed to explain the pattern of relationships among these variables?
2. What is the nature of those factors?
3. How well do the hypothesised factors explain the observed data?
4. How much purely random or unique variance does each factor include?

Power will be estimated for CFA and SEM using the regression-based and factor analytic methods. In regression, statistical power is the probability that a false null hypothesis will be rejected; therefore, power of an empirical test is important to identify true effects. According to Kline (2005) a minimum sample size of 100 is required to achieve minimal power in SEM. However, other factors must also be considered to achieve an acceptable power level.

In terms of adoption of B2B systems by SMEs in Amman, based on selected questions in the survey, enterprises may divide into high, medium and low B2B system adopters. Correlation has been examined to determine the discriminate validity of the survey. Discriminate validity is the extent to which items differentiate among the measurement scales. Multi-item approach (triangulation) also used to measure factors. Each factor has a minimum of two and up to seven questions in the questionnaire.

Further, triangulation measure use interval scales such as the five-point Likert scale to assess the reliability of the research. Triangulation used to examine the influence of internal and external organisational factors on extent of B2B system adoption in SMEs on one hand, and test the influence of B2B systems on SMEs performance and efficiency on other hand. At the same time, while ordinal scale is used to determine factors influence on B2B system adoption, nominal scale is used to measure the relationship between B2B system adoption and SMEs' characteristics and strategic that describes the SMEs type of business and size. Some survey questions are used to collect data for this research-employing interval, ordinal and nominal measurement scales.

Five-point Likert scale is based on perceptual scale measuring the degree to which a respondent agrees to a statement. It typically provides five to seven categories of agreement ranging from 'strong disagree' to 'strongly agree'. Moore (2004) noted that Likert-like scales are appropriate when increments between response levels cannot be easily identified. For example, in order to develop an item to measure factors such as frequency of e-transactions through B2B systems or extent of practicing B2B systems in local and global TPs, require a separate item for each potential response, e.g. one item for each category- None, <25%, 25-50%, 51-70%, 70%+.

The third part of the questionnaire explored the improvements in performance and efficiency in the SMEs through the B2B systems measured using five-point Likert scale as follow, None, <25%, 25-50%, 51-70%, 70%+. For each hypothesis regions of acceptance and rejection are calculated, hence if the test results fall outside the region of acceptance the null hypothesis is rejected. However, if the test result falls within the region of acceptance the null hypothesis not rejected.

The results in terms of rejecting or accepting the hypothesis based upon the results of the questionnaire, test conducted to compute the probability values (P) and Chi-Square test. P values are measured the extent to which the test statistics disagrees with the null hypothesis. To reduce the P of rejecting a true null hypothesis, this research has been chosen a 95 percent confidence level with a 5 percent significance level ($\alpha= 0.05$). Hence, the P value compared to the stated significance level ($\alpha= 0.05$). If the (P) value is less than the significance level, the null hypothesis will be rejected. If the (P) value is greater or equal to the significance level, the null hypothesis will be rejected. The corresponding Z value or standard error associated with a 95 percent confidence level is 1.96. The statistic that used to measure the five-point Likert scale reliability in research is Cronbach's alpha. While there is disagreement among researchers as to the minimum acceptable alpha level for confirming reliable scale, 0.70 percent or greater is preferable, but approximately 0.60 percent is the most widely supported standard (Cohen *et al.*, 2003).

4.10 Summary of Chapter

This Chapter described the methodology used for the data collection and analysis of primary data used to test the stated hypotheses in this research. This Chapter identified the data required, location of data, target population and sample frame. The sampling techniques and analysis performed were explained through the identification of key relationships between factors of interest, measurement scales and evaluation criteria. In addition, the collected data will be statistically processed and analysed. Then, the test results will be interpreted and presented. This chapter presented a theoretical structural

model representing the relationships between the factors and a measurement model linking the factors of interest. Then, the data collection instrument is presented along with a discussion of how it is tested, revised and administrated using the four-step Dillman model. The proposed relationships in the structural model are tested through the research hypotheses. The structural measurement model also is comprised of the relationships between factors. The research questions and hypotheses will be tested and answered using the SEM. The structural measurement model also is tested as part of the CFA procedure.

CHAPTER FIVE

QUALITATIVE RESULTS AND ANALYSIS

(Interview)

5.1 Introduction

In this research both qualitative and quantitative methods were used. Qualitative research was conducted to refine the constructs and their multi-item measurement scales that were developed based on the literature review and adapted to a developing country such as Jordan. Qualitative research is used in many separate disciplines. It does not belong to a single discipline. Nor does qualitative research have a distinct set of methods that are entirely its own. Qualitative research is inherently multi-method in focus (Tuft & Halling, 2002). Initially this research involved qualitative research to understand the perspectives of SME managers in Amman of B2B system adoption and the influence on performance and efficiency. The use of multiple methods or triangulation reflected an attempt to secure an in-depth understanding of the phenomenon in question. In addition, exploratory research is used when researchers must define the problem more precisely, identify relevant course of action and gain additional insights before an approach can be developed (Malhtra 2003). In this research, coding and descriptive analysis of the data gathered at the qualitative approach were done immediately after each interview to ensure that valuable data were not lost. The data collection through the ten personal face-to-face interviews in SMEs in Amman was conducted in October 2009. At the time of the initial telephone contact with the SME managers, an appointment is solicited for a 30-minute time slot to complete the interview questions.

Throughout this chapter the collected data from interviews is analysed and presented according to the methodology described in chapter four (4.3). The collected data from ten interviews with SMEs in Amman is being analysed and compared with previous literature research presented in Chapter Three. The analyses are presented in the order of the research hypotheses and questions. Ten SMEs have had up to three years of experience doing their activities, functions and transactions with B2B systems and have during the last year, begun selling over the Internet.

5.2 Sample and Representation

This research and based on DOS (2007) classified an enterprise with less than five employees as a small enterprise, while those with 5 to 19 employees are classified as medium enterprises (DOS 2007). The sample for interview purpose in this research was obtained through 2008 Annual Handbook Index (AHI), which was established by the Jordanian Chamber of Commerce (JCC). A sample of ten SMEs in a city of Amman was selected. Enterprise name, contact information and enterprise size were provided by Jordanian AHI 2008. Additional information collected during the initial contact includes the name and titles of each SME manager and potential respondents. Table 5.1 presents the sample distribution according to size and sector of enterprise.

Table 5.1
Sample Frame and Distribution

Size / Sector	Services	%	Industrial	%	# of Total SMEs	Total %
Small	3	30	2	20	6	50
Medium	3	30	2	20	4	50
Total	6	60	4	40	10	100

As shown above in Table 5.1, 60 percent of the total sample is small size enterprises in both services and industrial sectors. It is also indicated that 40 percent of the sample are categorised as medium size enterprise in both services and industrial sectors. A brief description of the ten enterprises is represented below. Table 5.2 shows the characteristics of these enterprises.

Table 5.2
Interviewed SMEs Description

Enterprise (E)	Size	Sector	Description	No. Employees
E1	Small	Industrial	Established in 1997 and adopted B2B systems since three years to deal with its local and global TPs and suppliers	4
E2	Medium	Industrial	Established in 1999 and adopted B2B systems since three years	13
E3	Medium	Services	Started activities in 2001 and adopted the B2B systems in 2006. Software and hardware system servicing	8
E4	Small	Services	Established in 2003 and adopted the B2B systems in 2007	3
E5	Small	Services	Established in 1996 and adopted B2B systems in 2006	4
E6	Medium	Industrial	Established in 1994 and adopted B2B systems in 2006 Pharmaceutical distributor	18
E7	Medium	Services	Established in 2004 and adopted B2B systems in 2007	9

E8	Small	Industrial	Established in 2001 and adopted B2B systems in 2006. Distributor of furniture, kitchens and doors	4
E9	Small	Services	Established in 1997 and adopted B2B systems in 2005. Family owned business, middlemen in the textile business	4
E10	Medium	Services	Established 1991 and adopted B2B systems in 2006, producer and seller of textiles	18

The first enterprise (E1) is categorised as a small size in the industrial sector. It was established in 1997 and adopted B2B systems since three years to deal with its local and global TPs and suppliers. It is employing four workers. Therefore, it was selected to be one of the interviewed enterprises.

The second enterprise (E2) is categorised as a medium sized enterprised in the industrial sector. It was established in 1999 and adopted B2B systems since three years. The manager has a very good perception of the improvements in IT in Jordan. It is employing 13 workers. Therefore, it was selected to be one of the interviewed enterprises.

The third enterprise (E3) is categorised as a medium sized enterprise in the services sector. It started activities in 2001 and adopted B2B systems in 2006. It is a software and hardware systems services, which offers consulting and maintenance of its client. It is employing eight workers. Hence, it was selected to be one of the interviewed enterprises.

The fourth enterprise (E4) is categorised as a small sized enterprise in the service sector. It was established in 2003 and adopted B2B systems in 2007. It is a Website services provider. It is provide the ability for its TPs to log into the company's system

look at the daily inventories and choose the type of products. It is employing three workers. Therefore, it was selected to be one of the interviewed enterprises.

The fifth enterprise (E5) is categorised as a small sized enterprised and operates in the service sector. It was established in 1996 and adopted B2B systems in 2006. The owner has a very good perception of the improvements in IT in Jordan. It has been mainly using the Internet for communication (e-mail) purposes. It used the B2B systems mainly in connection with the suppliers. It is employing four workers. Therefore, it was selected to be one of the interviewed enterprises.

The sixth enterprise (E6) is categorised as a medium sized enterprise in the industrial sector. It was established in 1994 and adopted B2B systems in 2006. It is a pharmaceutical distributor, it imports products from European countries and distribute them to 400 client companies all over Jordan and abroad. It has a home page connected with the inventory system. It is possible for the client companies to log into the company's system with a password, look at the daily inventories, choose the type of product, the quantity wanted and then submit the order through the web site. It is employing 18 workers. Hence, it was selected to be one of the interviewed enterprises.

The seventh enterprise (E7) is categorised as a medium sized enterprise and operates in the services sector. It was established in 2004 and adopted B2B systems in 2007. The company has had a static home page presenting their products for the last four years and has been using e-mail for communication purposes for many years. It is employing nine workers. Therefore, it was selected to be one of the interviewed enterprises.

The eighth enterprise (E8) is categorised as a small sized enterprise in the industrial sector. It was established in 2001 and adopted B2B systems in 2006. It is a distributor of furniture, kitchens and doors. It presently imports products from out of Jordan and distributes and sells to local small companies (clients) and private individuals. After it started using the Internet and e-commerce it was able to establish contacts with foreign companies such as TPs and suppliers. More recently, it has also used B2B systems for sending and receiving orders. It is employing four workers. Therefore, it was selected to be one of the interviewed enterprises.

The ninth enterprise (E9) is categorised as a small sized enterprise in the services sector. It is a family owned business. It was Established in 1997 and adopted B2B systems in 2005. It is import the raw materials and export the finished products, which is produced by a local SME in the textile sector. It used the Internet daily for (EDI) or/and (B2B) e-commerce operations such as receiving and fulfilling orders, sending digital images of their products, communicating with their clients company and doing Internet banking. It is employing four workers. Therefore, it was selected to be one of the interviewed enterprises.

The tenth enterprise (E10) is categorised as a medium sized enterprise that operates in the services sector. It was founded in 1991 by merging three different companies, which were owned by three brothers. It is a producer and seller of textiles. It used the Internet since 1998. It had a home page since 1999 and adopted the B2B systems in 2005, which provides basic information about the company. It is employing 18 workers. Therefore, it was selected to be one of the interviewed enterprises.

5.3 Interviews Results and Descriptive Analysis

Interview procedure ensured that the questionnaire efficiently and adequately meets the current research objectives, while minimising the response burden. The pre-testing answers questions such as: length of interview, willingness of respondents to participate in the questionnaire, potential wording problems, miscommunications, sample deficiencies, topical deficiencies and delivery issues. All pre-tests are delivered in the same manner as the final instrument (questionnaire). After the pre-test the questionnaire through the group of interviewees, the questionnaire is updated and re-evaluated to ensure that it still meeting the research objectives. Using 22 questions in each interview with the ten of the SMEs interviewed in Amman the following results are summarized and presented below:

Regarding to the questions, which explore the effect of the internal and external organisational factors on B2B system adoption in SMEs in Amman, the results are presented below:

Based on the perceptions of interviewed SME managers, there is a positive significant and direct effect between internal and external organisational factors on B2B system adoption. Majority of the respondents reported that external organisational factors such as external pressure and readiness have more effect on B2B system adoption than the internal organisational factors. Hence, this leads to the conclusion that the factors have a strong effect on B2B system adoption in SMEs in Amman.

Regarding to the questions, which explore the effect of B2B system adoption on performance in SMEs in Amman, the results are presented below:

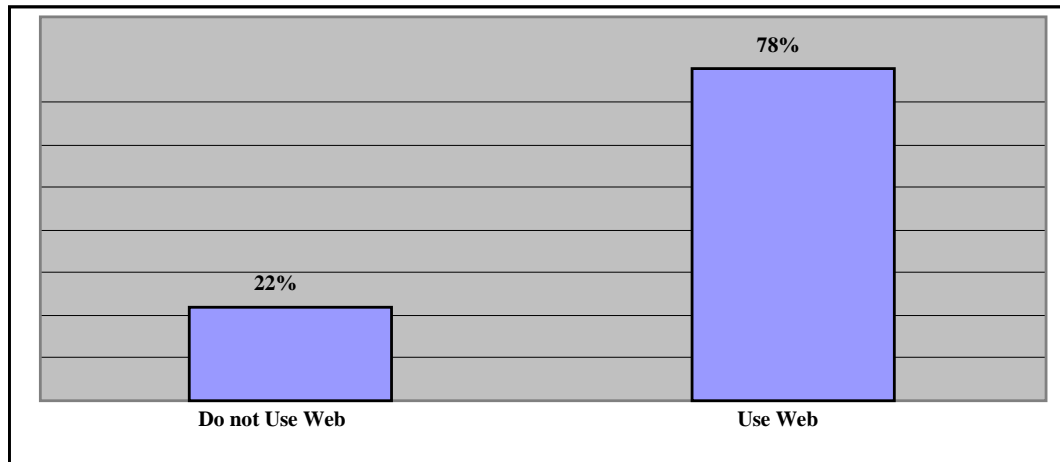
Based on the results from respondents, that there is a positive direct effect of B2B system adoption on SMEs performance through cost reductions, increase productivity and increase sales. They also noted that indirect effect could be a resulted of B2B system adoption on their profit. B2B system adoption has direct effect on productivity, sales and costs. Hence, this leads to the conclusion that the adoption of B2B systems in SMEs in Amman leads to improvement in performance.

Regarding to the questions, which explore whether B2B system adoption in SMEs in Amman can have an effect on improvements in efficiency or not the results are presented below:

Based on the results reported from respondents, which there is a positive direct effect of B2B system adoption on operation efficiency, inventory management control and PBP in SMEs in Amman. In addition, the results from interviews show that the B2B system adoption enables SMEs in Amman to reach not just the higher improvements in efficiency of business activity, but also improves SMEs performance by creating the competitive advantage, which influences the enterprises success in both local and global markets. Where interviewed SME managers in Amman were asked if their enterprise ever registered with any web-based international trading site or EM, the answers are shown in Figure 5.1.

Figure 5.1

The Interviewed SMEs that been Registered with a International Web (n=10)

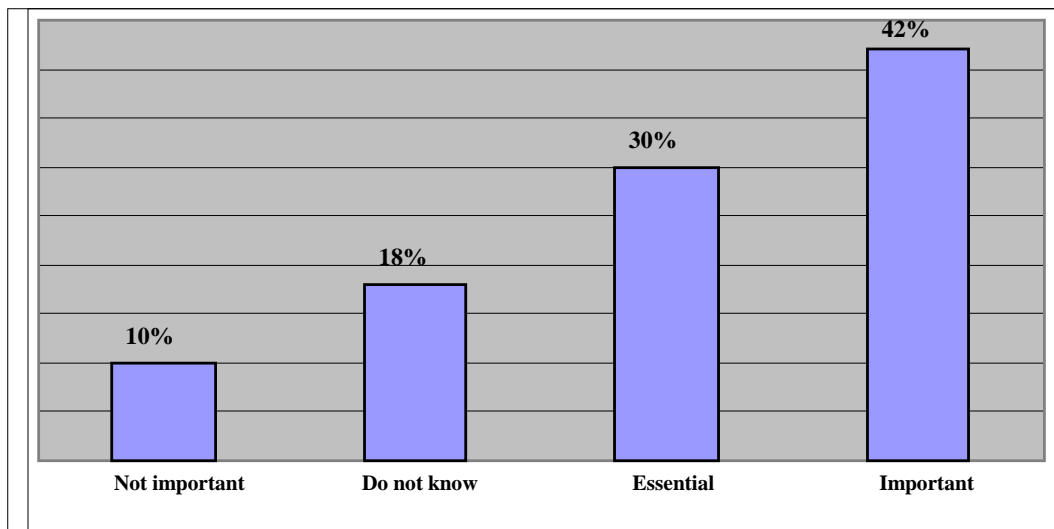


Source: Developed and calculated from Interviews

While the SME managers asked about the importance of B2B system adoption to the current needs of their enterprises, their answers are shown in Figure 5.2.

Figure 5.2

The Importance of B2B Systems by SMEs in Amman (n=10)



Source: Developed and calculated from Interviews

5.4 Summary of Chapter

It is very important for SMEs in Amman to realise the benefits of ordering products and/or services through the B2B systems. It will make the transactions, businesses and its processing more efficient, decrease the search costs and make it easier for TPs to search for products that they need to buy. In addition to looking at the factors driving the B2B system adoption in SMEs in Amman, this research also examined some issues in the adoption process. The challenge faced by SMEs and the methodology followed in the adoption process was studied. The B2B systems also present promotion, products and/or services information, advertisements support and training on their web sites. Thus, from the SMEs in this research, it was recommended to use the B2B systems for promotional purposes by presenting information about products and services that TPs may request. A huge amount of information has to be exchanged between SMEs and its TPs. This includes product and/or services information, support and training, etc.

CHAPTER SIX

QUANTITATIVE RESULTS AND ANALYSIS

(Survey - Questionnaire)

6.1 Introduction

Qualitative and quantitative research methods can be used in the same research, either together or separately (Colwell 1990). Hence, it is possible to obtain more information than by using only one method, and to validate qualitative research with quantitative data (Hunt 1991). While the qualitative method was conducted to refine the constructs in this research, the quantitative method was used to test the constructs and to enhance the generalisability of statistical findings. SEM was used to test the constructs and confirm the research measurement model (Figure 4.1) of the B2B system adoption in SMEs in Amman and the influence on performance and efficiency improvement.

The population parameters in this research were obtained through the 2008 Annual Handbook Index (AHI), which was compiled by the Jordanian Chamber of Commerce (JCC). According to the DOS (2009a) in Jordan there are 135,585 small enterprises in the industrial and services sectors. The total number of medium sized enterprises in the industrial and services sector in Jordan is 6,780 (DOS 2009a). Table 6.1 reports the population demographics by enterprise size, which indicates that 95.2 per cent of all SMEs in the industrial and services sectors are small sized enterprises. Table 6.1 also shows that 68.5 per cent of all SMEs in Jordan are service-based enterprises.

Table 6.1
Population Demographics by Enterprise Size

No. Employees	Services Sector	Industrial Sector	Total Number in Population	%
1-4	94,909	40,676	135,585	95.2
5-19	2,550	4,230	6,780	4.8
Total Number in Population	97,459	44,906		
%	68.5	31.5		100

Source: Developed for this research from (DOS 2009a; MIT 2008).

Table 6.2 presents the total number of the registered enterprises in Jordan according to their economic sectors and capitalisation market for each sector.

Table 6.2
Economic Sectors in Jordan and Registered Enterprises

Sector	Number of Registered Enterprises	Capitalization Market (JD million)	% of Total
Trade	175775	904.6	49.5
Services	120188	333.8	33.9
Industrial	55377	394.9	15.6
Construction	2335	112.1	0.7
Agriculture	376	4.6	0.3
Total	354051	1750.1	100

Source: (DOS 2009a)

Table 6.2 indicates that 49.5 per cent of all registered enterprises in Jordan are categorised into two sectors, namely services as 33.9 per cent and the industrial sector as 15.6 per cent.

The data for the survey was collected through a process of hand-delivering 500 questionnaires to SMEs in Amman, during the period from October 2009 to January 2010. The majority of the respondents completed the questionnaire on the same day as

they received it during a one-on-one meeting. However, some of the selected SMEs asked the author to collect the questionnaire after two days. Once the data was collected, the focal research was performed, including the data entry, coding and analysis. The ‘SPSS v17’ statistical package and ‘EQS v 6.1’ software package, which contains SEM and CFA, were used to analyse the data. Cohen et al. (2003) recommend a stringent standard with minimum loadings of 0.50 per cent for CFA and Eigenvalues greater than 1.0. One of the strengths of CFA is the ability of that model to load the research's measurement variables (items) on the hypothesised factors to achieve a perfect simple structure and explain 100% of the variance. CFA also tests a theoretical simple factors’ structure, which was implied by the research measurement model and did not allowed cross-loadings to improve the fit indices (Kline 2005). In this research CFA was conducted by using the correlation matrix and tested by using the Chi-square statistic and recommended fit indices. The results and analysis are presented in this Chapter, which are divided into specific headings.

6.2 Sample and Response Rate

A stratified random sample of 500 SMEs in Amman were selected. SMEs' names, contact information, enterprise size and sector information for each enterprise were collected from the Jordanian AHI (2008). Additional information was collected during the initial contact includes names and titles of SME's managers. Table 6.3 presents the sample distribution according to size and sector of enterprises.

Table 6.3
Sample Distribution

Size \ Sector	Services	Sample % of total	Industrial	Sample % of total	Total	%
Small	250	62.5	150	37.5	400	80
Medium	50	50	50	50	100	20
Total	300		200		500	
%	60		40			100

Table 6.3 indicates that 80 per cent of the entire sample are small sized enterprises in the industrial and services sectors. It also indicates that 60 per cent of the entire sample is categorised as services sector in both small and medium sized enterprises. 20 per cent of the entire sample is a medium sized enterprise in the industrial and services sectors. Table 6.3 shows that 40 per cent of sample is categorised as belonging to industrial sector, comprising small and medium sized enterprises.

Of the 500 SMEs contacted, 57 SMEs reported that they had stopped using any kind of B2B systems. This left a total of 443 SMEs that were eligible for participation. In addition, of the 443 eligible SMEs, 75 SMEs refused to participate in the survey for a variety of reasons. This equates to a total of 368 SMEs that agreed to participate, and an

overall 73.6 per cent response rate ($368/500 = 73.6\%$). Sample size is summarised in Table 6.4

Table 6.4
Sample Size

	Number	Per centage
Contacted SMEs	500	
Respondents (Questionnaire)	368	73.6

The variables of enterprise size, economic sector and activity (industry) were used to determine whether the sample was representative the population of SMEs in Amman that might or might not have adopted B2B systems. Table 6.5 presents the size and the economic sector for each SME, in which size was indicated by the number of employees.

Table 6.5
Sample Demographics by Size and Sector

Enterprise Size	Sector						Total	%
	Services			Industrial				
	Number	Respondents	%	Number	Respondents	%		
Small (1-4 employee)	250	218	87.2	150	107	71.3	325	81.3
Medium (5-19 employee)	50	15	30	50	28	56	43	43
Total	300	233	77.6	200	135	67.5	368	73.6

* 87.2 = 218/250
77.6 = 233/300

71.3 = 107/150
67.5 = 140/200

30 = 15/50

56 = 28/50

81.3 = 325/400

43 = 43/100

In the sample of small enterprises in the industrial and services sectors, 325 enterprises had less than 5 employees, while 43 enterprises had 5-19 employees. Table 6.6 presents the sample demographics by respondents' title or position.

Table 6.6
Sample Demographics by Respondent Title

Respondent Title	# of Respondents	Per centage (%) of Sample
Owner	165	44.8
General manager	110	29.9
Purchasing Manager	56	15.2
IT Director	37	10.1
Total	368	100%

Non-response bias was estimated by using the control variables such as sector and enterprises' size. Table 6.7 reports the number of enterprises in each sector that were unwilling to participate in the questionnaire. From the 500 SMEs sample, 57 SMEs were stopped using the B2B systems; hence they were excluded from the following Table 6.7 as a non-responders. The evidence in this research is indicated that every sectors and size in the sample was represented.

Table 6.7
Non-Responders by Sector and Size

Size	Sector	# of Non Respondents	# of Respondents	% of Non- Respondents
Small	Services	25	218	11.4
	Industrial	28	107	26.1
Medium	Services	8	15	53.3
	Industrial	14	28	50
Total		75	368	20.4

6.3 Data Analysis

In this research, the factors of B2B system adoption were developed based on the literature. The sources of the collected data, which are included in this analysis, were resulted and analysed from a sample of 368 SMEs in Amman in the industrial and services sectors. Respondents were asked to indicate their perceptions of the factors on a five-point Likert scale.

6.3.1 Questionnaire Validity

The questionnaire was pre-tested in the following stages.

The first stage is content validity, which is the process of using judgment to determine whether the scales contain items (measurement variables) that are adequate to measure the factors of interest (Dillman 2000; 2003). In this research, the first content validation of questionnaire was conducted in an iterative manner by the researcher and his supervisors during the preparation period for the questionnaire. All versions of the questionnaire were developed and revised during this process. The second content validation was performed independently by two university professors in Jordan, one PhD candidate in telecommunication law; one manager in Jordan who is an expert in the area of operation management, one professor, and PhD candidate in Jordan in the area of IT.

The respondents in this stage were asked to:

- Estimate whether or not all of the necessary items were included to measure the factors of interest;
- Suggest additional questions or items for deletion so as to avoid unnecessary or redundant questions;
- Evaluate whether or not the scales support appropriate analysis of the factors of interest.

Comments made during stage one were reviewed by the researcher and were incorporated into the questionnaire.

The second stage is readability, which consisted of knowledgeable people evaluating the questionnaire. It was measured through the following points:

- Whether or not all of the words were understandable;
- Whether or not the questions were applicable to every potential respondent;
- Readability in both clarity and length; and
- Professionalism of presentation.

This stage consisted of surveying ten respondents in Amman including two managers, five MBA students in one of the Jordanian universities, one PhD candidate in operation management and two PhD candidates in IT. The researcher reviewed the completed questionnaires, and after incorporating the comments from this stage, 75 questions for the pilot study were developed.

The third stage was the pilot study, which was used to improve the questionnaire to avoid errors that could make the results questionable or uncertain. It consisted of testing 75 questions within ten SMEs as a pilot study that followed and tested the proposed procedures in this research. The questionnaire was distributed and administered to ten SMEs in Amman in the industrial and services sectors. SMEs in the pilot study were primarily selected from the AHI (2008). In this stage the following points were considered:

- Answers were equally distributed;
- Identify questions were skipped by respondents; and
- Questionnaire was evaluated for issues that could harm the response rate.

After questions were scored into factors, a Pearson correlation was run between the factors that they were proposed to measure. While the pilot sample size was small, the measurement variables for measuring the same factor were correlated with each other in excess 0.60 per cent. The overall alpha for the pilot study was 0.71 per cent. In this stage, none of respondents from the pilot study skipped any of the questions. In addition, no evidence of multi-Collinearity was found in the pilot study. The average response rate in the previous hand-delivered and on-line version of the questionnaire studies was 30-50 per cent. It was expected that this research would have similar results, but the response rate for this research was much higher (73.6 per cent). The higher response rate was attributed to the personalised contact that the researcher made with each potential respondent from the SMEs sample in Amman.

6.3.2 Reliability Analysis

Questionnaire in this research asked questions about the experience and perceptions of the respondents about B2B system adoption in SMEs in Amman and its influence on performance improvements in efficiency. Although some of the previous studies were directed at determining the validity of the data that respondents provided about their perceptions, the current research recognised several of the factors that related to reliability and validity concerns such as false information, inadequate sampling frame, poor questionnaire construction and structural bias. Reliability analysis, using statistical analysis processes such as Cronbach's alpha and hypothesis testing were conducted to allow data to make informed and accurate statements about the entire population, not just the sample.

The original purpose of factor analysis is to examine the associations among factors, based on the correlations between them to see if there are underlying factors. Since most of questionnaire's items in this research were adopted from prior researchers and were examined by the instrument developer, the factor analysis in this research was used to examine whether the construct of this research was the same as the original set of factors. The results of factor analysis were represented the construct validity of the questionnaire. In the current research, there were ten factors in questionnaire that required examination by factor analysis in this research.

These factors are internal organisational factors, external organisational factors, the extent of the B2B system adoption, productivity, sales, profitability, costs, operation efficiency, inventory management and control and PBP. Each factor was combined with several items that participants were required to answer in the questionnaire. Factor analysis was used to examine the items and each of these factors. Table 6.8 presents the factor loadings for the ten factors affecting B2B system adoption.

Table 6.8
Factor Loadings – Ten Factors for B2B System Adoption

Factor	Items	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Internal Organisational Factors	1	0.89	0.05	0.49	0.29	0.14	0.12	0.01	0.02	0.13	0.08
	2	0.90	0.19	0.12	0.06	0.18	0.22	0.13	0.14	0.22	0.14
	3	0.89	0.10	0.35	0.07	0.16	0.09	0.12	0.25	0.05	0.22
	4	0.90	0.24	0.26	0.09	0.12	0.07	0.22	0.12	0.04	0.23
	5	0.79	0.39	0.28	0.04	0.02	0.06	0.25	0.22	0.08	0.15
	6	0.87	0.11	0.30	0.06	0.03	0.21	0.08	0.24	0.05	0.13
	7	0.87	0.16	0.24	0.01	0.28	0.05	0.17	0.31	0.06	0.31
	8	0.78	0.05	0.25	0.12	0.09	0.26	0.04	0.35	0.27	0.16
	9	0.89	0.03	0.41	0.12	0.15	0.07	0.28	0.17	0.29	0.19
	10	0.78	0.17	0.49	0.11	0.22	0.09	0.15	0.41	0.24	0.02
	11	0.83	0.13	0.32	0.03	0.12	0.04	0.09	0.36	0.16	0.31
	12	0.82	0.14	0.35	0.18	0.14	0.24	0.12	0.18	0.22	0.27
	13	0.98	0.15	0.26	0.25	0.19	0.09	0.22	0.25	0.25	0.12
	14	0.85	0.06	0.28	0.09	0.22	0.01	0.13	0.09	0.08	0.14
	15	0.78	0.07	0.30	0.11	0.25	0.16	0.02	0.11	0.14	0.22
	16	0.89	0.09	0.24	0.18	0.24	0.05	0.12	0.18	0.24	0.05
	17	0.72	0.14	0.25	0.19	0.18	0.03	0.22	0.19	0.28	0.06

	18	0.82	0.16	0.22	0.22	0.07	0.07	0.25	0.22	0.11	0.07
	19	0.77	0.12	0.22	0.31	0.01	0.13	0.04	0.31	0.26	0.19
	20	0.72	0.09	0.24	0.19	0.12	0.16	0.38	0.17	0.15	0.24
	21	0.74	0.02	0.31	0.14	0.02	0.19	0.07	0.12	0.13	0.06
	22	0.89	0.01	0.35	0.27	0.02	0.22	0.11	0.21	0.27	0.25
	23	0.95	0.06	0.22	0.08	0.16	0.11	0.04	0.13	0.15	0.09
	24	0.83	0.02	0.29	0.21	0.06	0.17	0.09	0.17	0.26	0.01
	25	0.85	0.07	0.42	0.15	0.08	0.12	0.11	0.12	0.07	0.24
	26	0.82	0.05	0.40	0.29	0.02	0.14	0.18	0.01	0.19	0.29
	27	0.73	0.04	0.25	0.21	0.31	0.22	0.02	0.09	0.12	0.11
	28	0.91	0.03	0.38	0.24	0.09	0.15	0.31	0.08	0.14	0.02
External Organisational Factors	29	0.12	0.70	0.32	0.09	0.08	0.08	0.04	0.22	0.02	0.25
	30	0.15	0.76	0.21	0.11	0.12	0.05	0.09	0.25	0.23	0.14
	31	0.22	0.76	0.14	0.06	0.14	0.14	0.11	0.08	0.12	0.18
	32	0.32	0.78	0.19	0.15	0.22	0.16	0.06	0.15	0.14	0.07
	33	0.15	0.89	0.22	0.04	0.23	0.18	0.05	0.22	0.22	0.31
	34	0.16	0.86	0.25	0.19	0.15	0.19	0.02	0.12	0.23	0.12
	35	0.09	0.77	0.28	0.11	0.04	0.22	0.05	0.22	0.15	0.02
	36	0.01	0.77	0.17	0.16	0.09	0.31	0.09	0.15	0.24	0.16
	37	0.08	0.79	0.41	0.15	0.11	0.17	0.21	0.04	0.09	0.12
	38	0.05	0.87	0.36	0.24	0.06	0.12	0.04	0.08	0.29	0.11
	39	0.14	0.85	0.18	0.29	0.05	0.26	0.09	0.17	0.16	0.02
	40	0.16	0.75	0.25	0.11	0.03	0.18	0.10	0.33	0.15	0.23
	41	0.18	0.76	0.17	0.06	0.18	0.31	0.06	0.02	0.03	0.41
42	0.02	0.98	0.04	0.09	0.01	0.12	0.22	0.17	0.24	0.15	
Extent of B2B System Adoption	43	0.41	0.29	0.86	0.21	0.15	0.37	0.25	0.22	0.25	0.22
	44	0.49	0.33	0.86	0.35	0.35	0.41	0.34	0.29	0.32	0.39

	45	0.32	0.27	0.86	0.38	0.16	0.36	0.19	0.28	0.22	0.28
	46	0.35	0.12	0.91	0.22	0.12	0.18	0.22	0.12	0.40	0.16
	47	0.26	0.18	0.85	0.24	0.25	0.25	0.31	0.14	0.31	0.19
	48	0.28	0.19	0.73	0.12	0.08	0.29	0.17	0.22	0.35	0.22
	49	0.23	0.33	0.72	0.28	0.19	0.11	0.12	0.23	0.22	0.03
	50	0.24	0.34	0.87	0.15	0.17	0.18	0.12	0.15	0.17	0.17
	51	0.25	0.35	0.82	0.24	0.15	0.17	0.22	0.33	0.41	0.32
	52	0.12	0.22	0.86	0.16	0.18	0.22	0.25	0.31	0.36	0.14
	53	0.22	0.21	0.86	0.08	0.17	0.23	0.28	0.16	0.18	0.24
Productivity	54	0.05	0.16	0.18	0.78	0.15	0.17	0.22	0.19	0.25	0.25
	55	0.14	0.18	0.26	0.79	0.12	0.41	0.41	0.22	0.29	0.12
	56	0.28	0.06	0.42	0.87	0.09	0.36	0.23	0.31	0.11	0.22
Sales	57	0.02	0.17	0.12	0.41	0.86	0.19	0.29	0.17	0.11	0.23
	58	0.01	0.22	0.16	0.25	0.89	0.22	0.18	0.12	0.08	0.15
Profitability	59	0.02	0.21	0.12	0.29	0.22	0.75	0.08	0.14	0.15	0.04
	60	0.31	0.06	0.35	0.33	0.14	0.71	0.16	0.22	0.13	0.29
Costs	61	0.04	0.09	0.34	0.27	0.19	0.23	0.89	0.15	0.18	0.11
	62	0.19	0.33	0.38	0.22	0.11	0.15	0.88	0.06	0.13	0.06
	63	0.21	0.37	0.22	0.18	0.06	0.14	0.75	0.09	0.12	0.27
	64	0.06	0.12	0.24	0.26	0.22	0.09	0.71	0.22	0.18	0.11
	65	0.15	0.18	0.26	0.28	0.25	0.11	0.87	0.17	0.04	0.19
Operation Efficiency	66	0.01	0.12	0.32	0.23	0.10	0.06	0.22	0.85	0.19	0.33
	67	0.39	0.23	0.41	0.21	0.08	0.05	0.25	0.91	0.11	0.27
	68	0.12	0.15	0.29	0.35	0.15	0.22	0.19	0.89	0.26	0.22
Inventory Management & Control	69	0.01	0.07	0.19	0.34	0.16	0.05	0.33	0.18	0.86	0.22
	70	0.05	0.08	0.33	0.42	0.19	0.04	0.27	0.23	0.77	0.25
	71	0.18	0.03	0.27	0.26	0.22	0.08	0.12	0.15	0.85	0.28

Procurement Business Process	72	0.24	0.08	0.18	0.27	0.31	0.07	0.17	0.04	0.15	0.89
	73	0.19	0.08	0.16	0.24	0.17	0.10	0.41	0.19	0.24	0.87
	74	0.01	0.05	0.42	0.33	0.25	0.12	0.36	0.11	0.22	0.91
	75	0.06	0.01	0.12	0.25	0.04	0.12	0.18	0.33	0.12	0.88

* F1 is internal organisational factors, F2 is external organisational factors, F3 is extent of B2B systems, F4 is productivity, F5 is sales, F6 is profitability, F7 is costs, F8 is operation efficiency, F9 is inventory management and control and F10 is PBP.

The results from Table 6.8 indicated that all factor loadings were larger than 0.70 per cent, which represented acceptable factors and items. This indicates that analysis was based on a well-explained factor structure.

Cronbach's coefficient alpha was employed to measure the internal consistency reliability based on the mean or average correlation for each item in the scale with other items. Reliability was used in first and second - order factors and 75 items in this research. Each Cronbach's coefficient alpha of factors and items is shown in the following Table 6.9.

Table 6.9
Reliability Statistics

Factors (First and Second – Order Factors)		# of Items	Cronbach’s Alpha (α)
SMEs' Strategic in Practicing B2B Systems	Internal Organisational Factors	16	0.960
Perceptions of SME Managers	"	12	0.841
Readiness of TPs	External Organisational Factors	5	0.792
External Pressure by TPs	"	9	0.833
Frequency of e-transactions	Extent of B2B System Adoption	5	0.864
Practicing B2B Systems with TPs	"	6	0.791
Productivity	Performance Improvement	4	0.836
Sales	"	2	0.923
Profitability	"	2	0.891
Costs	"	4	0.929
Operation Efficiency	Efficiency Improvement	4	0.793
Inventory Management & Control	"	3	0.844
Procurement Business Process	"	3	0.921

According to Leech et al. (2008; 2005) Cronbach’s coefficient alpha should be above 0.70 per cent. Hence, as shown in Table 6.9, all of Cronbach’s alpha values were above 0.70 per cent in this research.

In this research, the factor analysis was conducted to examine the underlying structure for the 42 items of the internal and external organisational factors. Based on the prior studies conducted by Seyal and Rahman (2007; 2003) the items measured the internal and external organisational factors in this research were designed to be categorised into four factors: namely the SMEs' strategic use of B2B systems, perceptions of SME managers, the extent of readiness of B2B system adoption and external pressure by TPs.

Following Table 6.10 presents the factor loadings for the internal and external organisational factors, Eigenvalue and per centage of variance.

Table 6.10
Factor Loadings for the Internal and External Organisational Factors

Factor	Item	Factor Loadings				Eigenvalue	% of Variance
		1	2	3	4		
Internal Organisational Factors						7.644	47.775
SMEs' Strategic in Practicing B2B Systems	1	.896					
	2	.908					
	3	.896					
	4	.909					
	5	.796					
	6	.874					
	7	.876					
	8	.783					
	9	.896					
	10	.788					
	11	.839					
	12	.824					
	13	.983					
	14	.856					
	15	.783					
	16	.896					
SME Managers' Perceptions	17		.723				
	18		.823				
	19		.776				
	20		.726				
	21		.744				
	22		.891				
	23		.955				
	24		.834				
	25		.856				
	26		.822				
	27		.733				
	28		.911				

External Organisational Factors					2.499	15.616
Readiness of TPs	29			.705		
	30			.761		
	31			.765		
	32			.789		
	33			.897		
External Pressure by TPs	34				.860	
	35				.775	
	36				.778	
	37				.795	
	38				.879	
	39				.855	
	40				.750	
	41				.760	
	42				.980	

** 1 is SMEs' strategic, 2 is SME managers' perceptions, 3 is readiness and 4 is external pressure by TPs.*

Factors and items in Table 6.10 were consistent with prior studies conducted by Seyal and Rahman (2007; 2003).

For the extent of the B2B system adoption, 11 items were examined. Based on the prior research that was conducted by Thong and Yap (1995) the items were designed to be categorised into two factors: Frequency of e-transactions and practicing B2B systems with TPs. Following Table 6.11 presents the items and factor loadings for the rotated factors of the extent of B2B system adoption.

Table 6.11
Factor Loadings for the Extent of B2B System Adoption

Factor	Item	Factor Loadings		Eigenvalue	% of Variance
		1	2		
Extent of B2B System Adoption				1.564	9.77
Frequency of e-Transactions	43	.866			
	44	.864			
	45	.860			
	46	.911			
	47	.859			
Practicing B2B Systems with TPs	48		.733		
	49		.723		
	50		.876		
	51		.826		
	52		.868		
	53		.862		

** 1 is e-transactions and 2 is practicing B2B.*

The results indicated that all factor loadings were larger than 0.70 per cent, which represented acceptable factors and items that were recommended by Lgbaria and Livari (1995). Moreover, all factors and items design were consistent with prior research that was conducted by Thong and Yap (1995).

For the dependent factors: namely SMEs' performance improvement (Productivity, sales, profitability and costs) and SMEs' efficiency improvement (operation efficiency, inventory management and control and PBP), the factor analysis was conducted to examine the underlying structure for the seven factors and 22 items. Following Tables 6.12 and 6.13 present the items and factor loadings for the SMEs' performance and efficiency improvement.

Table 6.12

Factor Loadings for SMEs' Performance Improvement

Factor	Item	Factor Loadings				Eigenvalue	% of Variance
		1	2	3	4		
SMEs' Performance Improvement						2.338	15.232
Productivity	54	.785					
	55	.793					
	56	.875					
Sales	57		.868				
	58		.895				
Profitability	59			.755			
	60			.710			
Costs	61				.894		
	62				.886		
	63				.755		
	64				.710		
	65				.877		

* 1 is productivity, 2 is sales, 3 is profitability and 4 is costs.

Table 6.13

Factor Loadings for SMEs' Efficiency Improvement

Factor	Item	Factor Loadings			Eigenvalue	% of Variance
		1	2	3		
SMEs' Efficiency Improvement					1.055	6.525
Operation Efficiency	66	.850				
	67	.913				
	68	.895				
Inventory Management and Control	69		.862			
	70		.777			
	71		.855			
Procurement Business Process	72			.899		
	73			.878		
	74			.910		
	75			.887		

* 1 is operation efficiency, 2 is inventory management and control and 3 is PBP.

All factors and items had satisfactory alpha values that were higher than 0.70 per cent established for exploratory research. Based on the findings of these tests, it was concluded that the items and factors in this research met the various criteria for evaluating and demonstrating satisfactory social and business studies.

The next stage of the data analysis was estimating the reliability of the respondents using the questionnaire's items and the factors' scores. Two hundred and eighteen small service enterprise respondents were labeled as SS. A total of 107 small industrial enterprises respondents were labeled as SI. While 15 a medium service enterprise respondents were labeled as MS, the total of 28 medium industrial enterprise respondents were labeled as MI. In all 368 respondents were labeled as small services and industrial enterprises (SSI), medium services and industrial enterprises (MSI), small and medium services enterprises (SMS) and small and medium industrial enterprises (SMI). In this research, reliability was examined by using the Pearson Correlation Coefficient. The Pearson's Correlation Coefficient across all of 75 questions in part two and part three in the questionnaire were calculated for (SS & SI), (MS & MI), (SMS & SMI) and (SSI & MSI). The correlations between (SS & SI), (MS & MI), (SMS & SMI) and (SSI & MSI) for each of the scored factors and items were presented in Table 6.14.

Table 6.14

Pearson Correlation Coefficient between Items A cross Sample Groups

Factor	Items	SS & SI	MS & MI	SMS & SMI	SSI & MSI
		Correlation	Correlation	Correlation	Correlation
F1	1	0.961	0.998	0.855	0.856
	2	0.960	0.897	0.997	0.878
	3	0.971	n/a	0.980	0.879
	4	0.973	0.987	0.784	n/a
	5	0.957	0.895	0.999	0.659
	6	0.998	0.658	0.975	0.899
	7	0.982	0.779	0.984	0.952
	8	0.782	0.794	0.985	0.772
	9	0.985	0.856	0.876	0.935
	10	0.856	0.659	0.874	0.876
	11	0.977	0.899	0.855	0.937
	12	0.947	0.892	0.783	0.927
	13	0.658	0.980	0.896	0.798
	14	0.955	0.789	0.788	0.977
	15	0.715	0.560	0.704	0.982
	16	0.953	0.999	0.789	0.875
	17	0.840	0.874	0.934	0.780
	18	0.915	0.876	0.956	0.836
	19	0.855	0.783	0.950	0.988
	20	0.750	0.896	0.945	0.972
	21	0.660	0.788	0.920	0.782
	22	0.980	0.839	0.999	0.965
	23	0.830	0.824	0.975	0.846
	24	0.834	0.983	0.984	0.977
	25	0.760	0.844	0.985	0.947
	26	0.872	0.955	0.876	0.658
	27	0.744	0.999	0.954	0.955
	28	0.891	0.975	0.986	0.789

F2	29	0.856		0.876		0.988		0.975
	30	0.822		0.778		0.849		0.998
	31	0.733		0.888		0.910		0.897
	32	0.911		n/a		0.850		n/a
	33	0.875		0.856		0.992		0.987
	34	0.997		0.839		0.786		0.985
	35	0.980		0.824		0.998		0.876
	36	0.784		0.983		0.975		0.874
	37	0.999		0.844		0.985		0.876
	38	0.975		0.955		0.984		0.783
	39	0.984		0.987		0.875		0.896
	40	0.985		0.958		0.873		0.788
	41	0.876		0.668		0.879		0.839
	42	0.874		0.855		0.789		0.824
F3	43	0.855		0.997		0.897		0.983
	44	0.997		0.980		0.780		0.844
	45	0.980		0.889		0.836		0.955
	46	0.875		0.897		0.826		0.999
	47	0.873		0.856		0.983		0.975
	48	0.879		0.878		0.865		0.984
	49	0.789		0.879		0.972		0.985
	50	0.897		0.856		0.892		0.856
	51	0.999		0.897		0.980		0.990
	52	0.975		0.942		0.830		0.880
	53	0.984		0.978		0.834		0.998

F4	54	0.985	0.952	0.760	0.982
	55	0.876	0.772	0.872	0.782
	56	0.874	0.935	0.744	0.985
	57	0.876	0.876	0.891	0.856
	58	0.783	0.937	0.955	0.977
	59	0.896	0.978	0.834	0.947
	60	0.788	0.952	0.856	0.658
	61	0.839	0.772	0.822	0.955
	62	0.999	0.935	0.733	0.998
	63	0.975	0.658	0.911	0.658
	64	0.984	0.955	0.875	0.955
	65	0.985	0.715	0.842	0.715
	F5	66	0.876	0.953	0.864
67		0.983	0.850	0.822	0.835
68		0.844	0.785	0.792	0.830
69		0.955	0.830	0.970	0.834
70		0.990	0.834	0.957	0.760
71		0.885	0.760	0.998	0.891
72		0.745	0.895	0.982	0.920
73		0.765	0.862	0.782	0.799
74		0.892	0.798	0.985	0.866
75		0.843	0.874	0.882	0.872

** F1 is internal organisational factors, F 2 is external organisational factors, F3 is Extent of B2B system adoption, F4 is SMEs' performance improvement and F5 is SMEs' efficiency improvement.*

Table 6.15 summarised the results of Pearson's Correlation Coefficient across groups for all factors.

Table 6.15
Pearson Correlation Coefficient between
Factors A cross Sample Groups

Factors		SS & SI	MS & MI	SMS & SMI	SSI & MSI
		Correlation	Correlation	Correlation	Correlation
F1	1	0.991	0.789	0.985	0.759
	2	0.792	0.955	0.781	0.973
F2	3	0.875	0.957	0.847	0.985
	4	0.770	0.994	0.877	0.978
F3	5	0.890	0.879	0.940	0.955
	6	0.893	0.826	0.956	0.978
F4	7	0.892	0.962	0.984	0.987
	8	0.890	0.986	0.896	0.998
	9	0.758	0.777	0.927	0.975
	10	0.794	0.749	0.993	0.984
F5	11	0.775	0.966	0.894	0.873
	12	0.890	0.939	0.786	0.789
	13	0.998	0.975	0.978	0.780

** 1 is SMEs' strategic, 2 is SME managers' perceptions, 3 is readiness, 4 is external pressure, 5 is e-transactions, 6 is practicing B2B, 7 is productivity, 8 is sales, 9 is profitability, 10 is costs, 11 is operation efficiency, 12 is inventory management and control and 13 is PBP.*

All correlations between (SS & SI), (MS & MI) and (SMS & SMI) were significant for the respondents' scores for the questionnaire's items and factors scores. In contrast, all of the correlations between factors scores have values greater than 0.70 per cent, which implied that the factors' scores have adequate reliability for the CFA.

6.3.3 Data Screening of the Full Sample

The data sources (i.e., questionnaire respondents) were combined into data for a total of 368 respondents. The control variables were not shown in this section because they were tested at the end of the Chapter. Pearson's correlations were employed in this research to answer the research questions and to test all of the research hypotheses. When the factors had an approximately normal distribution, the Pearson (r) correlation, that is a parametric statistic, was used. Before examining the correlation between factors, the value of Skewness for each factor was measured to test the normality of each measurement variable. Leech et al. (2008) suggested that the factor is approximately normal if Skewness and Kurtosis of item is less than plus or minus one. The descriptive statistics for the full 368 respondents are summarised in Table 6.16.

Table 6.16
Descriptive Statistics for 75 Items from 368 SMEs

Factors	Items	Mean	SD	Skew	Kurtosis	Min	Max
1	1	2.40	0.84	0.65	-0.09	1.0	5.0
	2	4.00	1.11	-0.70	-0.82	1.0	5.0
	3	3.08	1.06	0.55	-0.78	1.0	5.0
	4	2.90	0.87	0.30	-0.02	1.0	5.0
	5	1.55	0.55	0.70	-0.07	1.0	3.45
	6	2.11	0.32	2.51	4.50	1.75	5.0
	7	3.66	1.25	-0.39	-1.15	0.60	5.0
	8	3.05	1.10	0.48	-0.74	1.0	5.0
	9	2.75	0.92	0.25	0.04	1.0	5.0
	10	1.44	0.55	0.90	-0.13	1.0	3.0
	11	4.11	1.16	-0.88	-0.55	1.0	5.0
	12	4.05	1.18	-0.87	0.56	1.0	5.0
	13	1.75	0.81	1.25	1.35	1.0	4.0
	14	2.65	1.25	0.60	-0.70	1.0	5.0
	15	2.75	1.40	0.42	-1.14	1.0	5.0

	16	2.70	1.35	0.55	-0.95	1.0	5.0
2	17	2.11	0.31	1.50	0.49	1.0	5.0
	18	2.30	1.20	0.82	0.08	1.0	5.0
	19	1.55	0.85	1.70	2.45	1.0	5.0
	20	1.50	0.85	1.80	2.45	1.0	4.0
	21	3.00	1.30	0.30	-1.10	1.0	5.0
	22	3.35	1.60	-0.25	-1.60	1.0	5.0
	23	2.25	1.35	1.05	-0.15	1.0	5.0
	24	2.55	1.00	0.75	0.35	1.0	5.0
	25	2.55	0.99	0.70	0.40	1.0	5.0
	26	2.65	1.11	0.60	-0.25	1.0	5.0
	27	2.50	1.38	0.60	-0.80	1.0	5.0
	28	2.25	1.40	0.90	-0.50	1.0	5.0
3	29	2.25	1.20	0.90	0.00	1.0	5.0
	30	1.56	0.90	1.45	0.98	1.0	5.0
	31	1.50	0.85	1.75	2.15	1.0	5.0
	32	2.15	1.20	0.80	-0.45	1.0	5.0
	33	3.10	1.15	-0.04	-0.77	1.0	5.0
4	34	2.50	1.25	0.50	-0.88	1.0	5.0
	35	1.60	0.80	1.20	0.60	1.0	4.0
	36	1.70	0.98	1.20	0.20	1.0	4.0
	37	2.10	1.04	0.80	0.05	1.0	5.0
	38	2.55	1.00	0.76	0.30	1.0	5.0
	39	2.50	0.97	0.71	0.42	1.0	5.0
	40	2.66	1.11	0.57	-0.25	1.0	5.0
	41	2.56	1.35	0.60	-0.80	1.0	5.0
	42	1.77	0.93	1.07	0.21	1.0	5.0
5	43	1.75	0.93	1.05	0.25	1.0	4.5
	44	2.33	1.38	0.84	-0.50	1.0	5.0
	45	2.25	1.20	0.89	0.00	1.0	5.0
	46	1.55	0.90	1.45	0.98	1.0	4.0
	47	1.50	0.85	1.75	2.15	1.0	4.0

6	48	2.15	1.20	0.80	0.45	1.0	5.0
	49	3.10	1.15	0.05	0.77	1.0	5.0
	50	2.65	1.35	0.25	-1.10	1.0	5.0
	51	3.07	1.20	-0.20	-0.91	1.0	5.0
	52	2.50	1.25	0.41	-0.88	1.0	5.0
	53	1.70	0.98	1.20	0.21	1.0	4.04
7	54	2.10	1.05	0.80	0.05	1.0	5.0
	55	2.50	1.55	1.10	0.60	1.0	5.0
	56	2.50	1.55	1.01	0.30	1.0	5.0
8	57	2.05	1.40	1.38	1.00	1.0	4.0
	58	2.40	1.75	1.20	0.55	1.0	5.0
9	59	1.70	0.90	1.12	0.35	1.0	4.04
	60	2.80	1.75	1.16	0.53	1.0	5.0
10	61	1.90	1.40	1.70	1.92	1.0	7.0
	62	3.24	2.09	0.70	-0.80	1.0	7.0
	63	2.27	1.80	1.47	1.16	1.0	7.0
	64	3.69	2.16	0.44	-1.26	1.0	7.0
	65	3.00	1.92	6.92	-0.23	1.0	7.0
11	66	3.88	2.09	0.35	-1.25	1.0	7.0
	67	2.75	2.80	1.45	0.65	1.0	5.0
	68	2.12	1.42	1.75	-1.15	1.0	4.0
12	69	3.65	1.55	0.80	-0.74	1.0	5.0
	70	3.03	1.41	0.05	0.04	1.0	4.04
	71	2.70	1.65	0.25	-0.13	1.0	5.0
13	72	1.45	0.80	-0.20	-0.65	1.0	7.0
	73	4.10	1.75	0.41	0.56	1.0	7.0
	74	4.02	1.30	1.20	1.25	1.0	7.0
	75	1.70	1.75	0.80	1.32	1.0	7.0

* Standard errors for Skew and Kurtosis are 0.166 and 0.333 respectively.

* Factors 1 and 2 are internal organisational factors, Factors 3 and 4 are external organisational factors, Factors 5 and 6 are the extent of B2B system adoption, 7 is productivity, 8 is sales, 9 is profitability, 10 is costs, 11 is operation efficiency, 12 is inventory management and control, 13 is PBP.

The next stage of data screening involved the identification of suspect SMEs. For example, of the SMEs whose responses in the questionnaire suggested that they were not members of the population for B2B system adoption. This research used the control variables such as enterprise size, enterprise economic sector and B2B systems' use duration to identify these responses and cases. Therefore, after deletion of the 17 suspect enterprises and six multivariate outliers, data from 345 SMEs (368-23 = 345) are left for analysis. Descriptive statistics for the 345 respondents as final sample are reported in Table 6.17. Since the control variables were identified and analysed separately in the end of this chapter, they are not shown in the following Table 6.17.

Table 6.17
Descriptive Statistics for 75 Items from the Final 345 SMEs

Factors	Items	Mean	SD	Skew	Kurtosis	Min	Max
1	1	2.38	0.83	-0.66	-0.97	1.0	4.0
	2	4.00	1.10	-0.75	-0.75	0.0	4.0
	3	2.00	0.06	-0.70	0.05	0.0	1.0
	4	1.95	0.20	-1.55	1.92	0.0	1.0
	5	1.45	0.50	0.19	-1.97	0.0	1.0
	6	2.1	0.30	2.55	4.55	0.7	4.0
	7	3.70	1.20	-0.40	-1.00	0.0	4.0
	8	1.98	0.19	-0.37	0.88	0.0	1.0
	9	1.90	0.29	0.02	1.04	0.0	1.0
	10	1.39	0.50	0.50	-1.75	0.0	1.0
	11	4.09	1.15	-0.85	-0.70	0.0	4.0
	12	4.04	1.16	-0.82	-0.60	0.0	4.0
	13	1.70	0.75	1.30	1.70	0.0	3.0
	14	2.60	1.20	0.65	-0.52	0.0	4.0
	15	2.70	1.40	0.45	-1.04	0.0	4.0
	16	2.65	1.30	0.62	-0.75	0.0	4.0

2	17	2.10	0.30	0.54	-1.73	0.0	2.0
	18	2.30	1.19	0.77	-0.15	0.0	4.0
	19	1.60	0.87	1.60	2.20	0.0	4.0
	20	1.50	0.85	1.73	2.98	0.0	3.0
	21	3.02	1.33	0.25	-0.16	0.0	4.0
	22	3.40	1.60	-0.29	-1.61	0.0	4.0
	23	2.15	1.20	1.20	0.65	0.0	4.0
	24	2.50	0.95	0.75	0.50	0.0	4.0
	25	2.51	0.93	0.70	0.47	0.0	4.0
	26	2.60	1.10	0.60	-0.25	0.0	4.0
	27	2.42	1.30	0.95	-0.15	0.0	4.0
	28	2.20	1.30	0.95	-1.15	0.0	1.0
3	29	2.50	1.20	0.85	-0.80	0.0	4.0
	30	1.60	0.90	1.40	0.80	0.0	3.0
	31	1.50	0.80	1.70	2.15	0.0	3.0
	32	2.20	1.20	0.70	-0.55	0.0	4.0
	33	2.99	1.10	0.02	-0.66	0.0	4.0
4	34	2.66	1.22	0.66	-0.53	0.0	4.0
	35	2.59	0.90	0.55	-0.15	0.0	4.0
	36	2.66	1.02	0.67	-0.17	0.0	4.0
	37	1.60	0.84	1.63	2.20	0.0	4.0
	38	2.15	1.22	1.22	0.65	0.0	4.0
	39	2.49	0.94	0.74	0.49	0.0	4.0
	40	2.52	0.92	0.70	0.47	0.0	4.0
	41	2.60	1.09	0.57	-0.23	0.0	4.0
	42	2.42	1.28	0.68	-0.52	0.0	4.0
5	43	2.18	1.20	0.71	-0.55	0.0	4.0
	44	2.97	1.16	0.02	-0.65	0.0	4.0
	45	2.55	1.28	0.30	-1.06	0.0	4.0
	46	3.10	1.19	-0.25	-0.80	0.0	4.0
	47	3.02	1.16	-0.17	-0.85	0.0	4.0

6	48	2.45	1.20	0.42	-0.80	0.0	4.0
	49	1.66	0.80	1.16	0.50	0.0	4.0
	50	1.70	0.95	1.20	0.22	0.0	4.0
	51	2.03	1.03	0.90	0.45	0.0	4.0
	52	2.50	1.65	1.08	0.60	0.0	4.0
	53	2.50	1.50	1.00	0.40	0.0	4.0
7	54	1.99	1.33	1.44	1.28	0.0	4.0
	55	2.30	1.69	1.31	0.91	0.0	4.0
	56	1.70	0.92	1.07	0.17	0.0	5.0
8	57	2.66	1.67	1.30	0.98	0.0	4.0
	58	1.80	1.30	1.90	2.75	0.0	4.0
9	59	3.09	1.99	0.85	-0.50	0.0	5.0
	60	2.15	1.67	1.54	1.55	0.0	4.0
10	61	3.55	2.09	0.55	-1.04	0.0	6.0
	62	2.96	1.91	0.92	-0.22	0.0	6.0
	63	3.75	2.01	0.42	-1.05	0.0	6.0
	64	2.14	1.65	1.50	1.55	0.0	6.0
	65	3.52	2.07	0.56	-1.02	0.0	6.0
11	66	3.73	2.04	0.44	-1.04	0.0	6.0
	67	2.65	0.98	0.54	-0.04	0.0	4.0
	68	2.65	0.99	0.56	0.41	0.0	4.0
12	69	2.55	0.90	0.50	-0.14	0.0	4.0
	70	2.66	1.00	0.66	-0.16	0.0	4.0
	71	1.78	0.95	1.05	0.15	0.0	1.0
13	72	1.77	0.94	1.05	0.16	0.0	1.0
	73	1.70	2.38	0.82	2.05	-1.96	0.0
	74	2.03	4.02	1.07	-0.72	-0.77	0.0
	75	2.50	1.98	0.06	-0.72	0.06	0.0

** Factors 1 and 2 are internal organisational factors, Factors 3 and 4 are external organisational factors, Factors 5 and 6 are the extent of B2B system adoption, 7 is productivity, 8 is sales, 9 is profitability, 10 is costs, 11 is operation efficiency, 12 is inventory management and control, 13 is PBP.*

6.4 Confirmatory Factor Analysis (CFA)

There are four reasons in this research to conduct a CFA analysis. First to test for evidence of one or more latent higher order factors that may contribute to explaining the variance in the factors and measurement variables. Secondly, to examine the convergent and divergent validity of the measures and indicators. Thirdly, to estimate the reliability of the measures examining the factors and measurement variables. Fourthly, to estimate the statistical power of the CFA analysis. Variety of definitions of Fit indices and statistics were used to evaluate the research model were presented by Marsh et al. (2004) and Kline (2005), which are summarised in Table 6.18.

Table 6.18
Definitions of Fit Indices and Statistics to Evaluate CFA and SEM

Statistics	Objectives/Aims	Acceptable Level
Chi- Square Test	Examine of how well the observed correlations fit the implied correlations in the proposed research model	Based on the degrees of freedom (DF) and chi-square table
Mardia's Normalised Estimate	A test that estimates the level of multivariate non-normality in factors and variables	< 10.0 preferably < 9.0
Standardised Root Mean-Square Residual (SRMR)	A test of absolute measures of non-fit based on the average squared-difference between the implied and observed models	≤ 0.10
Comparative Fit Index (CFI) - Max. Likelihood Estimate (ML)	Examine of relative fit – the percentage increase in fit of a model over that of the independence model	Lower suggested limit = (approx 0.90)
CFI Robust – Satorra-Bentler	A test that is adjusted for non-normality of factors and variables	Lower limit= (approx 0.90)
Root Mean – Square Error of Approximation (RMSEA) – ML	A test of absolute measure of non-fit based on the size of the residuals between the implied and observed data.	≤ 0.10

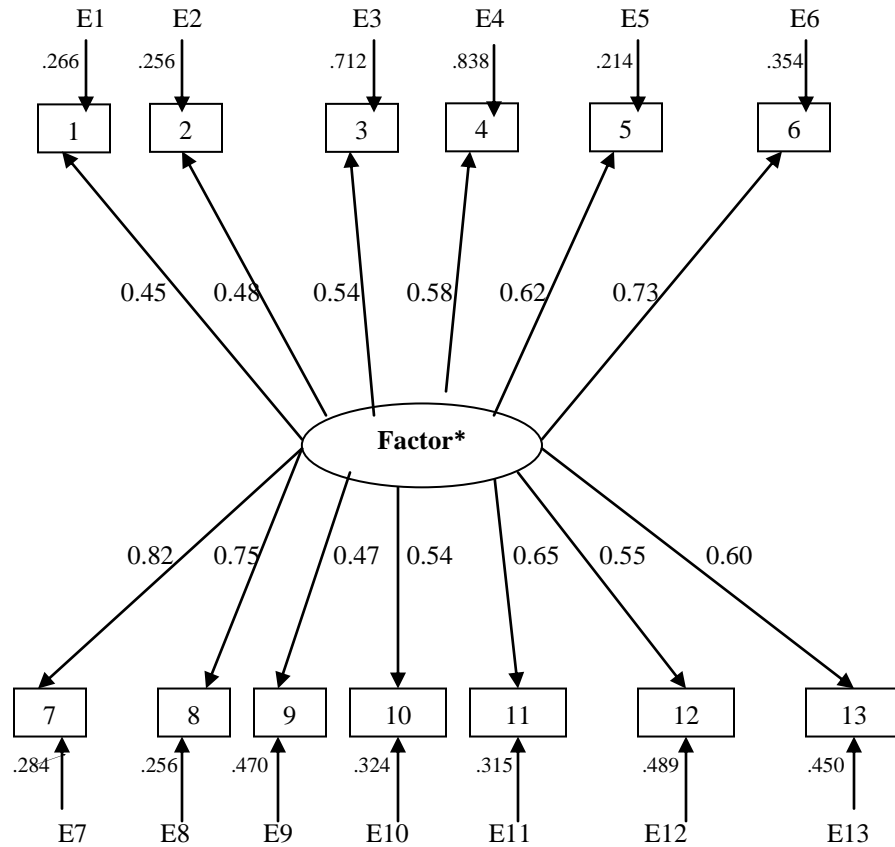
	Calculated based on ML estimate	
RMSEA Robust – Satorra – Bentler	A test Adjusted for any non-normality of data	≤ 0.10

Source :(Marsh et al., 2004; Kline 2005)

6.4.1 Single Factor Model

In this research, the CFA was conducted on two measurement models to test convergent and divergent validity between factors. The first model is a single-factor model (SFM) where all factors were hypothesised to load on one factor. SFM often was reported in SEM studies in operations management. Fixed parameters are shown with a (*). In testing the model, the variance of the latent factor is set to 1.0*. Hence, all relationship coefficients were freely estimated. Figure 6.1 shows the SFM with related percentage for each factor.

Figure 6.1
Single Factor Model



In addition to the SFM as shown in Figure 6.1, the following Table 6.19 reports the fit indices and statistics for the SFM.

Table 6.19
Fit Indices and Statistics for SFM

Statistic	Single factor
Chi – Square	335.30
Degrees Freedom (DF)	367
Mardia’s Normalised Estimate	9.20
Free Parameters	27
Fixed Parameters	16
Comparative Fit Index (CFI-ML)	0.74
CFI-Robust	0.74
Standard Root Mean-Square Residual (SRMR)	0.092
Root Mean Square Error of Approximation (RMSEA-ML)	0.18
RMSEA-Robust	0.12

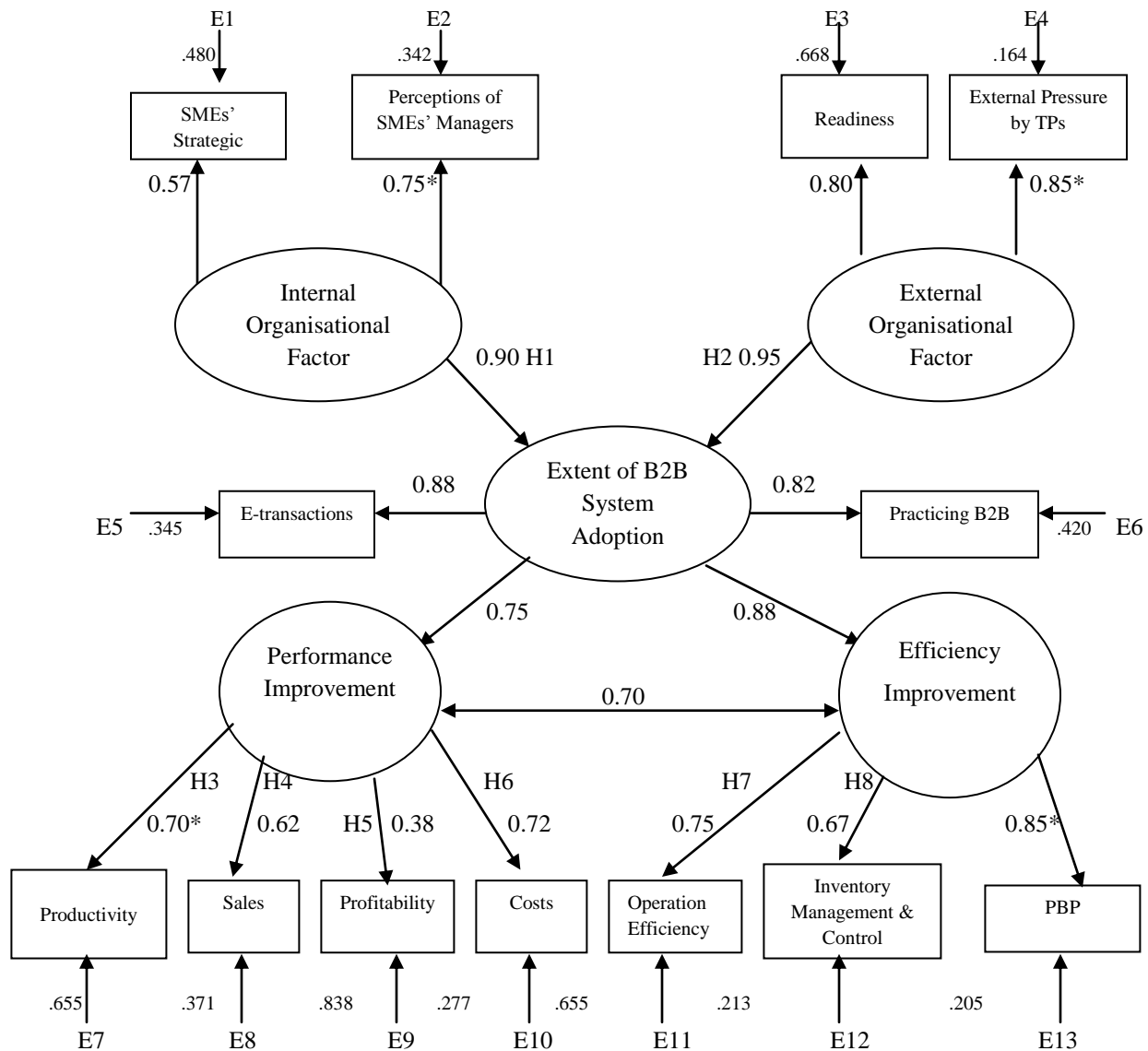
Table 6.19 shows a CFI 0.74 per cent and RMSEA 0.18 per cent - this indicates that the SFM is inadequate for representing these factors. According to Kline (2005) the poor fit indices suggests that there is more than one latent factor. Since the literature did not support testing a two, three or four-factor models, a five-factor model was conducted and examined in this research. Previous researchers such as Kline (2005) and Brews and Tucci (2004) have shown that a five-factor model fits the data better than models with three or four factors.

6.4.2 Five - Factor (CFA) Measurement Model

In this research, the five-factor (CFA) model was used to examine convergent and discriminate validity. In this research also the test in this model was performed with the variance of all factors set 1.0*, allowing all loadings and covariance to be freely estimated. The pattern coefficients (i.e. the values on the arrows) were represented the factor loadings. The loadings were estimated while controlling for covariance between

factors. Therefore, the five-factor model in Figure 6.2 is the theoretical CFA research model to test the multiple factors.

Figure 6.2
CFA Five-Factor Measurement Model



Note that in CFA five-factor model the associations between factors were modeled as standardised covariance rather than relationship coefficients. The Table 6.20 reports the fit indices and statistics for the CFA five-factor measurement model.

Table 6.20
Fit Indices and Statistics for Five-Factor (CFA) Measurement Model

Statistic Name	Five Factor Statistics Results
Chi – Square	182.85
DF	344
Mardia’s Normalised Estimate	9.10
Free Parameters	35
Fixed Parameters	20
CFI-ML	0.91
CFI-Robust	0.890
SRMR	0.064
RMSEA-ML	0.093
RMSEA-Robust	0.090

From the Table 6.20, the evidence indicates that the research model meets the minimum recommended fit indices for acceptable fit with a CFI 0.91 per cent and RMSEA 0.093 per cent. The minimal difference between the ML and Robust results was indicated that there is no adverse effect due to non-normality in the few questionnaire’s items and factors that had kurtosis values above 3.0.

6.4.3 Validity and Higher Factors

The pattern matrix was reported in the following Table 6.21, which examined the relationships among factors to test their convergent validity through a perfect simple structure.

According to Kline (2005) convergent validity is found when the factors specified to measure a common underlying factor have relatively high pattern coefficients on that factor, i.e. 0.50 per cent or greater. In Table 6.21, which represents the CFA pattern matrix, the factors loadings are shown in columns 2-6. The pattern coefficients with "0" value means that the research model was tested without cross-loadings because CFA did not tested for varying degrees of simple structure as found in exploratory procedures.

Table 6.21
CFA Pattern Matrix - Five Factor (CFA) Measurement Model

Factors	Internal Org Factors F1	External Org Factors F2	Extent of B2B Adoption F3	Performance Improvement F4	Efficiency Improvement F5	R-Square (Communalities)
1	0.601	0	0	0	0	0.533
2	0.692	0	0	0	0	0.515
3	0	0.803	0	0	0	0.320
4	0	0.821	0	0	0	0.299
5	0	0	0.702	0	0	0.685
6	0	0	0.681	0	0	0.785
7	0	0	0	0.751	0	0.511
8	0	0	0	0.652	0	0.664
9	0	0	0	0.650	0	0.425
10	0	0	0	0.822	0	0.567
11	0	0	0	0	0.821	0.784
12	0	0	0	0	0.652	0.440
13	0	0	0	0	0.891	0.513
Eigenvalues	1.27	1.63	1.38	2.65	2.47	-----

** 1 is SMEs' strategic in practicing B2B systems, 2 is SME managers' perceptions, 3 is readiness, 4 is external pressure, 5 is e-transactions, 6 is practicing B2B, 7 is productivity, 8 is sales, 9 is profitability, 10 is costs, 11 is operation efficiency, 12 is inventory management and control and 13 is PBP.*

As all factors were loaded above 0.50 per cent, they were presumed to measure the relationships among factors (First and Second-Order factors) to test their convergent

validity through a perfect simple structure and all Eigenvalues were greater than 1.0, it evident that a simple structure existed in this model. Furthermore, since all of the 13 factors loadings were exceed 0.60 per cent, it was concluded that the validity power level at the CFA analysis is high.

Table 6.22 shows the correlation matrix, which was used to examine divergent validity. The factor correlations in Table 6.22 justify testing the existence of B2B system adoption as a second-order factor.

Table 6.22
Factor Correlations – Five Factor (CFA) Measurement Model

Factor	F1	F2	F3	F4	F5
F1	1.00	0.604	0.600	0.490	0.660
F2	0.604	1.00	0.656	0.556	0.676
F3	0.600	0.656	1.00	0.380	0.770
F4	0.490	0.556	0.380	1.00	0.720
F5	0.660	0.676	0.770	0.720	1.00

** F 1 is internal organisational factors, F 2 external organisational factors, F3 is the extent of B2B system adoption, F4 is SMEs' performance improvement and F5 is SMEs' efficiency improvement.*

Since none of the factor correlations were above 0.85 per cent, it was concluded that sufficient divergent validity existed in the model. In addition, a CFA analysis was performed with all factors correlations were fixed to 1.0, hence, this result in a Chi-square of value 332.15. A Chi-square difference test is then performed with the model in Figure 6.2 (Chi-square = 182.85). The evidence suggested that each factor is measuring a different phenomenon of activity.

In this research, measuring the construct B2B system adoption on a new continuous scale was validated through the correlations with other factors. Furthermore, construct validity is evident due to the correlation of B2B system adoption with other

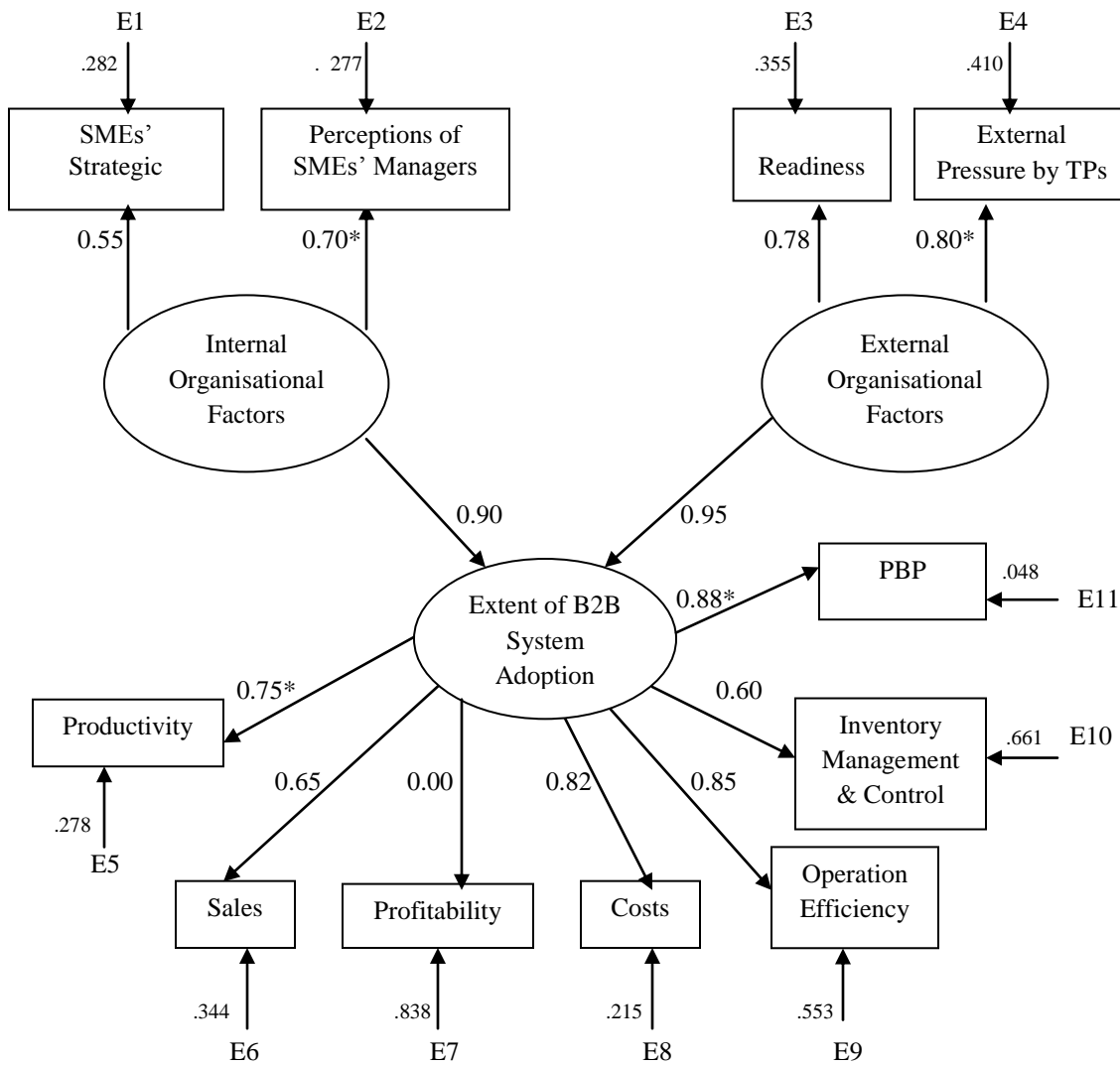
factors in the SEM of least 0.70 per cent or higher (Somers et al., 2003). The construct validity is further supported because higher levels of B2B system adoption were associated with higher level of SMEs' performance and efficiency improvement in SMEs in Amman. Brews and Tucci (2004) support measuring IT and IS in this manner because real-world enterprises tend to have varying degrees of technology adoption.

The positive correlations among factors in the five-factor (CFA) measurement model suggested that the proposed factors in this research, such as internal and external organisation factors and SMEs' performance and efficiency improvement (First-Order factors), were reliable representations of the measurement variables and were therefore appropriate for including in a structural model. Furthermore, evidence of the convergent and divergent validity was provided by the fit indices, CFI and RMSEA. If a CFI model contains factors that fail to provide simultaneously adequate convergent and divergent validity the solution is unlikely to lead to acceptable fit indices (Moore 2004).

6.5 Structural Equation Model (SEM)

In this research, there are two reasons for testing a structural equation model: First, to quantify the relationships among the factors in order to estimate the relationship between the extent of B2B system adoption and performance and efficiency improvement in SMEs in Amman - a main objective of this thesis. This was accomplished through estimating structural relationships coefficients. Second, to investigate whether some factors are more influenced by the extent of B2B system adoption than others. Following Figure 6.3 represents the theoretical model originally in Figure 4.1.

Figure 6.3
Structural Equation Model (SEM)
(First and Second-Order Factors)



As part of analysis, the variance of B2B system adoption was fixed; hence, the structure coefficients as shown in the arrows in Figure 6.3 were freely estimated. Furthermore, the parameters, which were marked with asterisks (*), were fixed to a value of (1.0). One relationship between factors was fixed in order to scale the factors e.g. the relationship between the extent of B2B system adoption and productivity.

The relationships between B2B system adoption and the internal and external organisational factors were freely estimated with a parameter constraint for the unstandardised relationships to be equal. Figure 6.3 reflects the standardised coefficients. Constraining the relationships to be equal between the extent of B2B system adoption and the internal and external organisational factors tested the proposition that the First-Order factors contributed equally to the composition of the Second-Order factor (the extent of B2B system adoption). Since the contribution of the internal and external organisational factors was unknown, it was assumed to be equal. The fit indices and statistics for the model are summarised in Table 6.23.

Table 6.23
Fit Indices and Statistics for Structural Equation Model (SEM)

Statistic	Structural Model
Chi – Square	180.50
DF	344
Mardia’s Normalised Estimate	9.20
Free Parameters	33
Fixed Parameters	18
CFI-ML	0.920
CFI-Robust	0.920
SRMR	0.069
RMSEA-ML	0.087
RMSEA-Robust	0.084

The CFI 0.920 per cent and RMSEA 0.087 per cent implied that the model has an acceptable fit. The low Mardia’s Estimate and small difference between the ML and Robust estimate indicates that the results were not affected by non-normal data. This implies that the model is reliable and valid for partially explaining the relationships

between factors. The standardised structural coefficients are shown on the arrows in Figure 6.3.

In this research, the internal and external organisational factors (First-Order factor) were used as driving forces to adopt B2B systems. The standardised correlations from these factors to B2B system adoption factor were 0.90 per cent and 0.95 per cent respectively. This implies that B2B system adoption explains 0.90 per cent of the variance in the external organisational factors (0.95^2) and 0.81 per cent (0.90^2) of the variance in the internal organisational factors. The evidence indicates that the internal and external organisational factors were not contributed equally to the composition of B2B system adoption among SMEs in Amman, with the external organisational factors contributing 0.09 per cent more than the internal organisational factors ($0.90 - 0.81 = 0.09$ per cent). This implies that the factors and measurement items were represented the external organisational factors were more important for B2B system adoption in SMEs in Amman than those represented the internal organisational factors.

The factors of the B2B system (e-transactions and practicing B2B with TPs) were provided a measure of the extent of B2B systems in SMEs at a point in time. This should improve the construct validity of the measurement. The supporting evidence for the construct validity of the extent of B2B system adoption was found in Table 6.23.

The fit indices were indicated that the model adequately represents the data. If the factor of B2B system adoption is not representing the data, the fit indices and reliability coefficients will be reduced. In addition, using the Second-Order factor (B2B system adoption) means that the relationships between the First-Order factors (internal and external organisational factors and SMEs' performance and efficiency

improvement) are no longer evaluated. Hence, the structural coefficients were used to estimate the individual "indirect relationship" between the internal and external organisational factors and other factors. For example, the indirect relationship between the external organisational factors and productivity was calculated by the expression $[0.95 \times 0.75 = 0.71 \text{ per cent}]$. Indirect relationship between the external pressure by TPs and sales was evaluated by the expression $[0.80 \times 0.90 \times 0.65 = 0.49 \text{ per cent}]$. These relationships mean that there were an implied relationship between the external organisational factors and productivity 0.71 per cent and the relationship between the external pressure by TPs and sales 0.49 per cent.

6.6 Control Variables

In order to improve the current research generalisability, the Second-Order model was examined under three control variables. They were enterprise size, B2B system use duration and economic sector. The control variables were categorised and coded prior to the analysis. Some categories have few SMEs to analyse separately, and therefore were combined into larger groups for ease of analysis.

Table 6.24 reports the fit indices of the second-order factors without the control variables, shows the analysis and tests the variables: specifically enterprise size, B2B systems' use duration and economic sector. Analysis 1 tests the variables: enterprise size and B2B systems' use duration. Analysis 2 tests the variable economic sector. The control variables in this research were assumed to have neutral relationships between factors and effects on B2B system adoption if the CFI is above 0.90 per cent and the

RMSEA (ML) is below 0.10. The degrees-of-freedom for these models remain 344 DF because no additional relationships are to '0' in testing the control variables.

Table 6.24
Control Variables Analysis

Control Variables	CFI - ML	CFI - Robust	SRMR	RMSEA ML	RMSEA Robust
Model without Control Variables	0.930	0.907	0.068	0.089	0.081
Model with size and B2B use for Analysis (1)	0.910	0.902	0.066	0.090	0.089
Model with economic sector for Analysis (2)	0.910	0.902	0.061	0.10	0.087

Collectively, these results suggest that the model has an acceptable fit regardless enterprise size, B2B systems' use duration and economic sectors. These findings are verity for the generalisability of the research measurement model. Results that were discussed earlier also highlighted the importance of the B2B system adoption for ongoing survival of SMEs in Amman. As previously discussed, B2B system adoption reduced many of the competitive advantages of larger enterprises and provided opportunities for SMEs in Amman. It also included a cost reduction and effective way for SMEs to sell and promote their products and services, launch new market, improve communications with local and global TPs and identify potential TPs.

6.7 Summary of Chapter

In this chapter the relationships between the B2B system adoption and SMEs' performance and efficiency improvement in SMEs in Amman were examined. This chapter also was examined the relationship between the internal and external

organisational factors and the extent of the B2B system adoption in SMEs in Amman. In order to understand what were the most important factors driving the B2B system adoption in SMEs in Amman, a correlation and factor analyses were conducted. The questionnaire in this research was conducted to collect the primary data by using the developed methodology in Chapter Four. This Chapter evaluated and reported the findings and the information collected from the distributed questionnaire. The SEM analysis supported the proposition that the B2B system adoption in SMEs in Amman reflects the internal and external organisational factors sufficiently to represent them as a single constructs in structural models. Measuring the B2B system adoption on a continuous scale permits representation of the varying extents to which B2B systems were adopted. The correlation coefficient meant that the greater the degree of the extent of the B2B system adoption in SMEs in Amman, the greater the improvement in the SMEs' performance and efficiency.

CHAPTER SEVEN

DISCUSSION

7.1 Introduction

The level of IT and IS integration in business processes is constantly growing. This growth is correlated with the higher universality of the extent of IT and IS adoption and simplicity of use. The B2B systems have a bigger potential to be adopted in large enterprises that own enough resources for such experiments, while SMEs often sidestep IT and IS integration in business, probably due to the fear of loss and limited knowledge in the area (Kadlec & Mares, 2002).

B2B systems are described as the realization of EC systems linked between two or more enterprises (Kerrigan & Roegner, 2001). The B2B systems were mostly spread in large enterprise sectors in Amman more than SMEs sector, because large enterprises give great attention to the adoption of new technologies and business transformation and the B2B system adoption guarantees advanced productivity, sales and profitability. The spread of B2B systems in various economic sectors are relating to modern enterprises' characteristics; big and constantly growing competition, decreasing variety of competitive advantages and durable treatment of profit as the result of cost reductions (Cloete 2003).

7.2 Interview Discussion

From the majority of the interviewed SMEs in Amman, E1, E5, E6 and E10 were mentioned that the importance of the local and global competitions and the external

pressures by TPs due to the e-transactions with local and global TPs. This relationship effects on the ability to adopt B2B systems. In addition, they reported that the impact of e-transactions differs across SMEs and can be very different in the industrial and services sectors in Amman. The majority of interviewed SMEs except E4, perceived that the B2B system adoption have a direct positive affect on performance and efficiency improvement in their enterprises. The factors of performance improvement such as profitability and return on investment (ROI) were not significantly directly affected by B2B system adoption (E2, E3, E4, & E8). The respondents' comments were divided into three groups: positive, neutral and negative. The positive comments were consisted of comments on benefits of B2B system adoption. Six firms (E1, E4, E5, E7, E9 & E10) were mentioned that the greatest benefits from the adoption of B2B systems are improved PBP (e-procurement), which cuts back the need for additional sales services contacts and FedEx expenses. One organisation (E2) was commented that B2B system adoption did not benefit its enterprises, which was classified as one of the negative group. Two firms (E3 & E8) were commented that they were experienced neither positive nor negative effects of B2B system adoption on their enterprise's performance and efficiency improvement, thus they were grouped as neutral comments group. One organization (E8) said: "the B2B system adoption are a great tool for SMEs to deal with local and global TPs, but will also decrease the profit due to increased the competition". In relation to the consequences of B2B system adoption in SMEs in Amman, one organisation (E10) mentioned that the B2B system adoption as a business tool brings desirable, direct and indirect or anticipated changes that increase sales and improve PBP. At the same time, it brings an indirect or unanticipated change, hence, did not make a significant improvement in profit and ROI. However, B2B systems have a positive

significant effect on the SME sector improvement in Amman. Based on the ten interviews results the following section is provided the essential success factors of B2B system adoption in SMEs in Amman.

The first factor is the external pressure by local and global TPs. TPs' decisions to adopt B2B systems are the main motive for SMEs in Amman to adopt B2B systems, because it becomes an important competitive advantage (E6, E8 & E10). Sadowski et al. (2002) concluded the possibility for SMEs to maximise benefits from B2B system adoption and creating EM based on partnership relations, where products and/or services of more than one enterprise could be changed and the total cost of marketplace maintenance would be distributed between TPs. The external pressure by TPs could be very important factor, because large TPs owning B2B systems for orders' acceptance and processing, which they will refused to collaborate with SMEs have not B2B systems (Chanu 2001). In this research there also exists the probability of the local and global TPs that may accept B2B system adoption and maintenances costs, which is very important for SMEs in Amman. Furthermore, relationships with local and global TPs determine the success of B2B system adoption in SMEs in Amman.

The second factor is readiness. The success of B2B system adoption in SMEs in Amman also depends on the possibility used of IT. The spread of Internet is a critical indicator of the B2B system adoption. The level of IT in SMEs in Amman affected the ability of the B2B system adoption. Therefore, readiness force exerts powerful direct effects on the decision to adopt B2B systems in SMEs in Amman. The B2B system adoption and supervision directly connected to the need of IT specialists. In SMEs in Amman, the lack of IT specialists generates comparative high costs of B2B systems

technical supervision. It is also important to pay attention to the fact that the SME managers avoid B2B system adoption because of psychological motives.

The interviewed SMEs in Amman were agreed that the SME managers' perception is one of the main internal organisational factors, which was influenced on B2B system adoption (E4, E5, E9 & E10). In addition, there was agreement that just-by-time method and SME managers' knowledge are good reasons to adopt B2B systems (E2, E6, E7 & E10). Two firms (E1 & E3) were agreed that SMEs' strategic in practicing B2B systems are a good factor of internal organisational factors, which are influenced on B2B system adoption. Three SMEs (E4, E8 & E10) were added that low salary rate makes it difficult to attract skilled people, hence finding staff with computer and B2B systems expertise is an additional problem. Based on results from interviews it was recognized that the internal and external organisational factors were crucial factors for B2B system adoption by SMEs in Amman. The level of IS and IT infrastructure as an indicator of SMEs' readiness factor has often been identified as one of the main factor effects on B2B system adoption (E1, E6 & E8). The external pressure by local and global TPs was indicated as one of the main influential factor of external organisational factors on B2B system adoption in SMEs in Amman (E3, E5, E9 & E10). Furthermore, there were agreements among the interviewed SMEs that the external pressure by TPs, SMEs' readiness and SME managers' perceptions are the main factors effect on SMEs in Amman to adopt B2B systems. In addition, four of ten interviewed SMEs were mentioned that they are adopted B2B systems because their TPs have been using B2B systems (E3, E5, E9 & E10). They also added that the adoption of B2B systems facilitate the delivery of the value added services as part of a more intimate relationship

between SMEs and TPs in the value chain. Based on the influence and relationship between the internal and external organisational factors and the extent of the B2B system adoption, the results are summarised in Table 7.1.

Table 7.1
Internal and External Organisational Factors Influence

Factor	Total %
SMEs' Strategic in Practicing B2B Systems	10
SME Managers' Experiences & Perceptions	20
Readiness	30
External Pressure by TPs	40

SMEs in Amman were agreed that despite the extent of B2B system adoption in SMEs in Amman, it would take time to realise the benefits due to difficulties in changing relationships with TPs (E2 & E10). A majority of the participants were agreed that the Jordanian government's support is very important (E1, E2, E3, E4, E5 & E7). They also were commented that the government's decisions have both a positive and negative impact on B2B system adoption in SMEs in Amman. This impact depends on legislation in B2B systems area (E2, E4 & E5). Three SMEs (E6, E7 & E9) were mentioned that there is an indirect influence of the Jordanian government's support to adopt B2B systems in SMEs in Amman. The indirect influence of the government's support such as income tax privileges for computer equipment, which has raised the number of enterprises having computers that increased numbers of Internet users between enterprises and their TPs in Amman (E6, E7 & E9). In general, SMEs mentioned that the main goal in going online for B2B systems transactions was to improve the efficiency of the entire supply chain. (E6, E7 & E9) also were concerned to improve performance

through increase profitability, ROI and meet the TPs' demand. Other more or less important driving forces for adopting B2B systems are summarised in the Table 7.2.

Table 7.2
Important Driving Forces for Adopting B2B Systems

Variables	Total %
PBP	20
Operation Efficiency	20
Inventory Management & Control	10
Productivity	10
Sales	10
Profitability	10
Costs	20

Based on comments that were reported from ten interviewed SMEs, they were asserted that incentive in ICT is influential to encourage or limit SMEs in Amman to adopt the B2B systems or not. They also noted that Jordanian government encouraging enterprises in Amman to adopt B2B systems (E6, E7 & E9). For the SME sector, which generates about a half of Jordanian GDP, the interviewed SMEs were asserted that the B2B system adoption in a near future in majority of SMEs in Amman might become the necessity (E6, E7 & E9). For this reason, six of SMEs (E2, E3, E6, E7, E9 & E10) also added that it is important for SMEs in Amman to evaluate their possibilities and potential adoption of B2B systems.

7. 3 Questionnaire Discussion

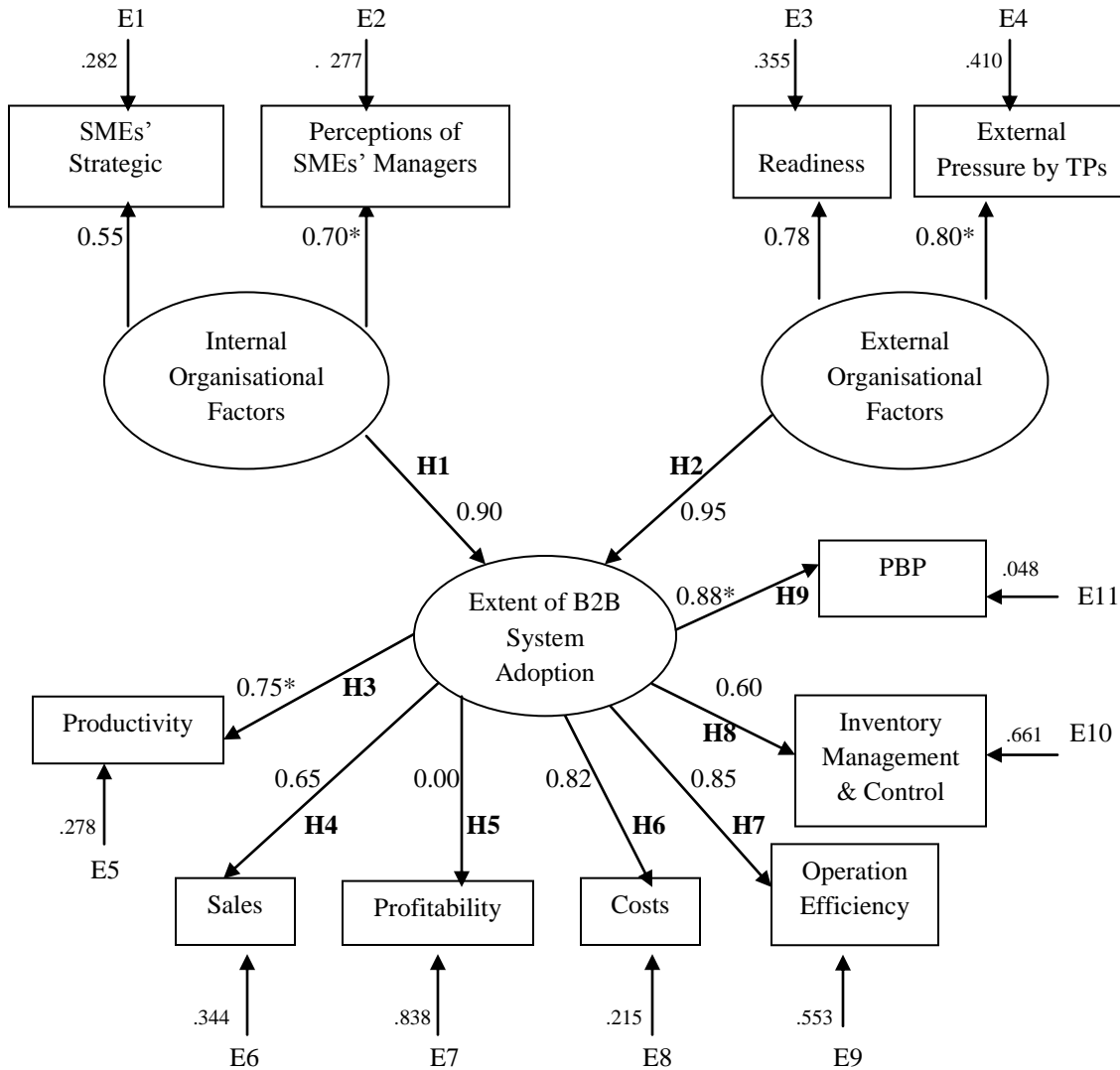
One of the main reasons for testing the SEM in this research is to examine the relationships between the B2B system adoption and performance and efficiency

improvement in SMEs in Amman. Since the literature was mixed on whether the effects and relationships between performance and efficiency are direct or indirect, the factor of B2B system adoption was used as a potential mediating factor. The other purpose for testing the SEM is to investigate whether some factors are more influenced by B2B system adoption than others factors.

7.3.1 Relationships between Factors

The following Figure 7.1 shows the relationship coefficients between the extent of the B2B system adoption and other factors, as implying direct relationship between B2B system adoption and each factor in performance and efficiency improvement except profitability. Hence, the relationship from the extent of B2B system adoption to profitability is insignificant, implying no direct effect. This means that the relationship between the B2B system adoption in SMEs and profitability is indirect and calculated through the related relationship coefficients [$0.75 \times 0.65 \times 0.82 = 0.40$ percent]. On the other hand, direct relationship coefficient from B2B system adoption to PBP is 0.88 percent, to inventory management and control is 0.60 percent and to operation efficiency is 0.85 percent, which implying a direct effect and relationship between B2B system adoption and SMEs' efficiency improvement. In addition, the direct relationships between B2B system adoption and productivity, sales and costs are shown in Figure 7.1. The relationship coefficients from efficiency to performance were evaluated for example by the expression [$0.88 \times 0.75 = 0.66$ percent] as relationship coefficient from PBP to productivity. It is also evaluated by the expression [$0.850 \times 0.82 = 0.70$ percent] as the relationship coefficient from operation efficiency to costs, etc.

Figure 7.1
Structural Equation Model (SEM)
(First and Second-Order Factors) with Hypotheses



As mentioned earlier, the relationship coefficients within the internal and external organisational factors were not equal. Also the relationship coefficients from B2B system adoption to the performance and efficiency improvement's factors were not equal. Hence, Chi-square difference tests were conducted between the constrained and unconstrained models. The following Table 7.3 is reported the results, which first column is listed the relationships that are constrained as shown in Figure 7.1.

Table 7.3
Chi-Square Hypothesis Tests

Relationships (Figure 7.3)	# Tests	Chi-Square Constrained	Chi-Square Unconstrained	Results H0:Tests
From SMEs' Strategic in Practicing B2B From SME Managers' Perceptions to B2B	1	211.12	179.60	Rejected H1
From Readiness to B2B From External Pressure to B2B	2	215.17	179.60	Rejected H2
From B2B to Productivity From B2B to Sales From B2B to Profitability From B2B to Costs	3	220.95	179.60	Rejected H3,H4,H5,H6
From B2B to Productivity From B2B to Sales From B2B to Profitability	4	181.99	179.60	Not Rejected
From B2B to Operation Efficiency From B2B to Inventory Mangt & Control From B2B to BPB	5	261.60	179.60	Rejected H7,H8,H9
From B2B to Operation Efficiency From B2B to Inventory Mangt & Control	6	183.90	179.60	Not Rejected
From B2B to Profitability	7	177.80	179.60	Not Rejected

The second column in the Table 7.3 is listed the number of the test and third column is shown the Chi-square value of the model with the corresponding relationships constrained. The fourth column is listed the Chi-square value of the model with no relationships constrained and the last column is shown the results of the null hypothesis test (H₀) that there were not a statistical difference between the two Chi-square values of $p < 0.001$. Not rejected statement in the last column is indicated that the equality constraint is properly imposed across the relationships. For example, tests number 1 and 2 were used to test a model where the relationships between the internal and external organisational factors and B2B system adoption were constrained to be equal. The last

column shows the results of the H_0 test that the model is equal. In this case H_0 is rejected, which indicates that the factors are contributing equally to the composition of the internal and external organisational factors in relation with B2B system adoption. Then, based on an examination of the differences in the relationship coefficients, the relationship was selected that may also be the source of inequality (readiness & external pressure) and dropped from the model prior to retesting. Test number 2 shows the results of the retested model where only SMEs' strategic and SME managers' perceptions are constrained to be equal (internal organisational factors). Hence, the resulting chi-square test indicates that the relationships are statistically equal. This means that the readiness and external pressure (external organisational factors), with the highest relationship coefficient are statistically different from either SMEs' strategic or SME managers' perceptions (internal organisational factors), which appear to be equal. Another example, test number 3, which was used to test the relationships between the extent of the B2B system adoption and performance improvement's factors (i.e. productivity, sales, profitability and costs) were constrained to be equal. The last column was reported that the results of the H_0 test that the models were equal. In this case H_0 is rejected, which is indicating that the factors were not contributed equally to the composition in relation to the B2B system adoption. Based on examination of the differences in the relationship coefficients, the relationship was selected that may be the source of inequality (Costs) was dropped from the model prior to retesting. Thus, test number 4 was shown the results of the retested model where only productivity, sales and profitability were constrained to be equal. The results of the Chi-square test were indicated that the relationships were statistically equal. This means that costs with the highest relationship of coefficient is statistically different from three of other factors (productivity, sales and

profitability), which was appeared to be equal. The remaining tests were interpreted in a similar manner.

The relationship coefficients to the external organisational factors (readiness (0.78 percent) and external pressure by TPs (0.80 percent) were significantly different from the internal organisational factors (SMEs' strategic and SME managers' perceptions) at $P < 0.001$ (test 1). SMEs' strategic with a coefficient of 0.55 percent and SME managers' perceptions 0.70 percent were not significantly different (test 2). This indicates that the external organisational factors were more important to the composition of the extent of B2B system adoption in SMEs in Amman than the internal organisational factors. The contribution of the factor costs (relationship coefficient = 0.82 percent) to the B2B system adaption is statistically different than the productivity (0.75 percent), sales (0.65 percent) and profitability (0.00 percent), which were found to be statistically equal at $p < 0.001$ (tests 3 and 4). The evidence in this research was suggested that the cost is more important to the composition and was influenced by the factor of the B2B system adoption than other factors of SMEs' performance improvement.

The Figure 7.1 indicates that factors which were comprised the SMEs' efficiency improvement were not equally affected by B2B system adoption (test 5). The relationship coefficients between the B2B system adoption to operation efficiency (0.85 percent), inventory management and control (0.60 percent) and PBP (0.88 percent) mean that the PBP factor was affected by the B2B system adoption more than either operation efficiency and inventory management and control (test 6). The relationship coefficients for operation efficiency and inventory management and control were statistically equal

at $P < 0.001$ (test 6). From the relationships coefficients, either sales (SMEs' performance improvement) and inventory management and control (SMEs' efficiency improvement) were much smaller factors that affected by B2B system adoption in SMEs in Amman than other variables. The reasons that costs (SMEs' performance improvement) and PBP (SMEs' efficiency improvement) were affected more than the remaining factors due to their relationship. The improvement in PBP is leading to cost reductions indeed. The evidence from the relationship coefficients in Figure 7.1 also suggests that changes in PBP that improve operation efficiency, productivity and cost were more affected by B2B system adoption in SMEs in Amman than process that affect sales and inventory management and control. However, the correlations were relatively large, which is indicating that all factors of SMEs' performance and efficiency improvement are important. Examining the indirect relationship coefficient from the extent of the B2B system adoption to profitability was much smaller affected by B2B system adoption as calculated through other factors 0.40 percent ($0.75 \times 0.650 \times 0.82 = 0.40$ percent).

7.3.2 Hypothesis Testing and Control Variables

The research hypotheses were tested by using the model shown in Figure 7.1. Observe that Figure 6.3 (chapter 6) is identical to Figure 7.1 except that relationships corresponding to the tested hypotheses are labeled.

The first and second null hypotheses were tested the relationship between the internal and external organisational factors and B2B system adoption in SMEs in Amman. They are tested in null form as:

H1o: There is no relationship between the internal organisational factors and the adoption of B2B systems in SMEs in Amman.

H2o: There is no relationship between the external organisational factors and the adoption of B2B systems in SMEs in Amman.

Based on the perceptions of SME managers in Amman, there is a positive significant and direct relationship between the internal and external organisational factors and B2B system adoption in SMEs in Amman. Majority of the respondents were reported that the external organisational factors such as external pressure by TPs and readiness have more effect on B2B system adoption than the internal organisational factors. H1o was tested by using the structured model shown in Figure 7.1. All relationship coefficients were significantly at $P < 0.05$. Based on the positive relationship coefficients between the internal organisational factors and the extent of the B2B system adoption, H1o was rejected. This supports the alternative hypothesis since the internal organisational factors have a direct effect of 0.90 percent on B2B system adoption. Based on the significant positive relationship coefficient of 0.95 percent between the external organisational factors and the extent of the B2B system adoption, H2o is rejected. Hence, this supports the alternative hypothesis that the external organisational factors have a direct effect on B2B system adoption. The rejection of H1o and H2o leads to the conclusion that the factors have strong effect on B2B system adoption in SMEs in Amman.

The next four hypotheses were tested the relationship between the B2B system adoption in SMEs in Amman and SMEs' performance improvement through four factors. They are tested in null form as:

H3o: There is no relationship between the extent of the adoption of B2B systems and the perceptions of SME managers of productivity.

H4o: There is no relationship between the extent of the adoption of B2B systems and the perceptions of SME managers of sales.

H5o: There is no relationship between the extent of the adoption of B2B systems and the perceptions of SME managers of profitability.

H6o: There is no relationship between the extent of the adoption of B2B systems and the perceptions of SME managers of costs.

Four null hypotheses were tested by using the structural model shown in Figure 7.1. Based on the significant positive relationship coefficients and direct effect between the B2B system adoption and productivity (0.75 percent), sales (0.65 percent) and costs (0.82 percent), H3o, H4o and H6o were rejected. This supports the alternative hypotheses that B2B system adoption has a direct effect on productivity, sales and costs. However, the direct relationship coefficient from B2B system adoption to profitability is insignificant, as shown in Figure 7.1 and consequently, H5o was not rejected. This concludes that the B2B system adoption in SMEs in Amman did not directly improved the enterprise profits. The indirect effect and relationship between the B2B system adoption and SMEs' profitability was calculated as the factors of three direct relationship coefficients ($0.75 \times 0.650 \times .82 = 0.40$ percent). The rejection of H3o, H4o and H6o leads to the conclusion that B2B system adoption in SMEs in Amman, account for the benefits that B2B system adoption creates in SMEs sector in Amman.

The last three hypotheses tested the relationship between the B2B system adoption in SMEs in Amman and the SMEs' efficiency improvement through three factors. They are stated in null form as:

H7o: There is no relationship between the adoption of B2B systems and the perceptions of SME managers of operation efficiency.

H8o: There is no relationship between the adoption of B2B systems and the perceptions of SME managers of inventory management and control.

H9o: There is no relationship between the adoption of B2B systems and the perceptions of SME managers of procurement business process.

The three hypotheses were tested by using the structure model shown in Figure 7.1. All the relationship coefficients were significant at $P < 0.05$. Based on the positive relationship coefficients between the B2B system adoption and the operation efficiency (0.85 percent), inventory management and control (0.60 percent) and PBP (0.88 percent), H7o, H8o and H9o were rejected. This supports the alternative hypotheses since B2B system adoption have a direct positive effect on three factors of SMEs' efficiency improvement. The rejection of the Ho7, Ho8 and Ho9 leads to the conclusion that B2B system adoption in SMEs in Amman makes improvement in these three factors and SME sector in Amman.

7.4 Summary of Chapter

A total of 368 respondents were examined, giving a response rate of 73.6 percent. This is higher than the typical 40-50 percent response rate most hand-delivered questionnaires achieved in previous studies. This Chapter tested the research null hypotheses for acceptance or rejection by using the primary collected data and evaluated the results based on the acceptance criteria defined in Chapter Four. This Chapter also restated the purpose and key findings of this research. The discussion in this Chapter of the findings from the interview and collected questionnaire were presented based upon the analysis in Chapters Five and Six. SMEs in Amman were provided the infrastructure and data bases on which electronic transactions are based have confirmed that gain through the B2B system adoption. Analysis of interviews results concluded that the sources of cost reductions are at both the internal and external level, and also through reducing the administrative costs associated with buying and reducing purchase prices through access to a border and better specified TPs. 90 percent of SMEs interviewed agreed that B2B system adoption definitely contributed to the internationalisation of their business. They also added that they started to adopt B2B systems to explore the global markets. Furthermore, they noted that all their transactions with TPs such as sending and receiving orders in relation to inventory, taking and confirming orders to and from TPs were B2B systems-based. For 90 percent of SMEs interviewed, the most important reasons to adopt B2B systems were cost reductions, increase sales and productivity as well as to improve PBP and operational efficiency. B2B system adoption offered SMEs in Amman with a variety of opportunities to improve their performance and efficiency.

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

The B2B systems evolved to include supply chain management as more enterprises outsource parts of their supply chain to their TPs. Selling to another enterprise by B2B systems involves negotiating over prices, delivery products and services specifications. The B2B systems are a marketplace, where many enterprises can buy from and sell to each other using a common technology platform. B2B systems also offer additional services, such as payment or logistics services that help participants complete a transaction. Further, B2B systems support community activities, like distributing economy and sector news, sponsoring online discussions and providing research on customer demand or sector forecasts for components and raw materials.

The current research analysis started with the development of a questionnaire that measured 13 factors (First and Second-Order factors) using 75 survey items (measurement variables). The questionnaire was administered to a total of 368 SMEs in Amman using a hand-delivery method. After screening the data, responses were analysed using CFA and SEM. CFA estimates the reliability and validity of the items measuring the factors. SEM examines the implied relationships among the factors. The following sections in this Chapter will discuss the objectives, findings, conclusions and recommendations, contributions, limitations and directions for future research.

The objective of this research is to empirically examine a structural measurement model explaining how the extent of B2B system adoption impacts the improvement of

the performance and efficiency of SMEs in Amman. This research develops measurement variables to evaluate the importance of the relationships between independent and dependent factors. This led to the development of two general factors that measure the extent of B2B systems; frequency of e-transactions and practicing B2B systems by TPs. The internal organisational factors were measured by two factors; SMEs' strategic in practicing B2B systems and the experience and perceptions of SMEs managers. The external organisational factors were measured by using two general factors; readiness and external pressure. The four factors used to measure the improvements of SMEs' performance were: productivity, sales, profitability and costs. Lastly, the improvements of SMEs efficiency were measured by three general factors; operation efficiency, inventory management control and PBP. The current research structural measurement model was tested under a variety of conditions and control variables including enterprise size, B2B system use duration and economic sectors.

8.2 Findings

This research has five general findings about the perceptions of SME managers in Amman regarding the extent of the adoption of B2B systems and its effects on SMEs' performance and efficiency.

The first finding was that B2B systems have a strong positive correlation with SME performance and efficiency, which suggests that the SME performance and efficiency improved as the extent of the B2B system adoption increased. The second finding was that the internal and external organisational factors influence on B2B systems must be presented before the improvements in performance and efficiency in

SMEs in Amman can be realised. The third finding was that the effect of B2B system adoption is fully mediated by changes and improvements in the SMEs' performance and efficiency. The fourth finding was that the four performance factors: productivity, sales, profitability and costs, and three efficiency factors: operation efficiency and inventory management and control and PBP are the most important contributors and measures of the SMEs' performance and efficiency in SMEs in Amman. The last finding was that a new continuous scale is measuring the factors of B2B system adoption and SMEs' performance and efficiency improvements.

The evidence and results in this research concluded that the B2B system adoption explains 37 percent of the variance in SMEs' performance, when performance is measured as a composite of productivity, costs, sales and profit. This quantifies the relationship between the B2B system adoption and improvements in SMEs' performance that was one of the principal objectives of this research. The effects of the B2B system adoption by SMEs in Amman are fully mediated by SME efficiency improvements. On average, the B2B system adoption explains 45 percent of the variance in SME efficiency when the efficiency is measured as a composite of PBP, operation efficiency and inventory management and control. The new factors measuring the B2B system adoption and the performance and efficiency improvements in SMEs on a continuous scale were improved over previous empirical studies because the variance explained of 37 percent in performance and 45 percent in efficiency. It was higher than the average of 12 percent, which was reported by Devaraj and Kohli (2003) using only IT usage and investment as predictor factors. It is also the largest reported effect of the B2B system adoption on SME performance and efficiency of any study reviewed as part of this

thesis. In addition, productivity, costs, PBP and operation efficiency were more affected by B2B system adoption than other factors due to their structured characteristics. This finding is supported in the management literature that suggests that there are improvement inter-dependencies among performance and efficiency outcomes where an improvement in one area leads to improvement in others. For example, Deming (1986) said that improved quality leads to reduced inventory and production cost. Goldratt (1986) shows how reduced inventory leads to reduced production costs and reduced flow-time, which leads to improved performance. Furthermore, as previously discussed, the literature suggests that processes that are highly structured meaning that they can be performed in a predictable sequence and with little human intervention are easier to automate.

The fully mediated relationships between the extent of the B2B system adoption, SMEs' performance and efficiency improvements concluded that changes in productivity, costs reductions and sales processes were the drivers for improved performance. At the same time, it suggests that changes in PBP and operation efficiency are the drivers for improved efficiency. While the B2B system adoption enables improvements in the business processes that are otherwise difficult to achieve such as automation of administrative functions and the global transactions of electronic documents, the evidence in this thesis concludes that SME performance and efficiency improvements were not improved without changes in the business process that initiate, receive and use the information. For example, while the sharing of valuable information is much easier using IT, it could theoretically occur through a variety of media including fax and digital or paper documents. However, these information media are more costly

to operate and transfer than most IT applications such as B2B systems and may suggest why some information was not shared between TPs prior to B2B systems.

This research demonstrates that measuring the internal and external organisational factors provided a more parsimonious model with higher statistical power. This means that both internal and external organisational factors that influence B2B system adoption are necessary for explaining the level of variance in SMEs performance and efficiency as seen in this research. The findings in this research also suggest that the methodological findings and contributions of measuring the influence of the B2B system adoption on SME performance and efficiency in Amman on a continuous scale appears to capture dimensions of the technology not previously measured in the services and industrial sectors in Amman. Specifically, it measures varying degrees of the extent of the B2B system adoption rather than simple presence, i.e. either the technology exists or not. It also explores various dimensions of the activities forming the B2B systems internal and external organisational factors that have not been collectively measured in a single study. This involves measuring SMEs' strategic in practicing B2B systems, perceptions and experience of SME managers (top management support), readiness and external pressure by TPs and internally on a continuous scale.

8.3 Control Variables

Examining the research structural measurement model in this research with the control variables; B2B system use duration, size and economic sector resulted without change in the model parameters. The lack of relationships between the mentioned control variables

and the B2B system adoption are poorly understood because only a few studies were reviewed as part of this research, e.g. Cango et al. (2004) addressed the same control variables. In this research, the finding of B2B system adoption in SMEs effects are not moderated by B2B system use duration is surprising considering the literature suggests that SMEs adopting B2B systems realised the benefits gradually over time (e.g. Hales et al., 2002). One explanation for the lack of moderating effects is the sampling method. Since SMEs in this research are using a stratified random sample, hence, not all categories are equally represented. Two of the control variables; enterprise size and economic sector are used to evaluate sample bias. As discussed in Chapters 5 and 6, the sample is biased toward SMEs and not contains any enterprise representing other sectors than services and industrial sectors in Amman. However, the parameters and fit indices of the proposed research model were unaffected after controlling the enterprise size and economic sector. Hence, this suggests that while the sample is biased, the bias dose not affect the model. In addition, this evidence implies that the sample bias does not harm the generalisability of the model.

8.4 Conclusions

The unique feature of the B2B systems is that it brings many TPs together in one central virtual market and enables them to transfer and share the information (Sculley & Woods, 2004). Adopting B2B systems by SMEs involves activities such as providing an infrastructure of computers, software and Internet connectivity between SME managers and employees. This infrastructure also used to link the SMEs to its TPs, as well as internally. In addition, adopting B2B systems involves activities such as the sharing of planning and control, accounting and TPs' information and transactions. This includes the online execution of transactions and orders, checking logistics, providing products and servicing support, accessing records, developing and marketing new services and products, education and collecting feedback.

The effort of SMEs in the context of B2B system adoption in SMEs is mostly limited by the adoption of traditional information technologies, such as e-mail, Internet and web page, but for the reason of effective B2B system adoption in enterprises it is necessary to integrate the higher-level of B2B systems decisions: EM, catalogues, etc. Furthermore, the impact of the adoption of the B2B systems by SMEs is asserted by both the internal and external organisational factors: readiness, SMEs' strategic, SME managers' perceptions and the external pressure by TPs. While all factors that effect B2B system adoption in SMEs in the measurement model in this research are important, readiness and external pressure appear to be more important than others factors for achieving proper levels of B2B systems. Hence, SMEs' readiness includes the infrastructure and Internet access that allows SME managers and employees to communicate with their TPs. The external pressure by TPs includes the sharing of

planning and control information electronically, electronic payments, education and training, products and services development activities and transferring. These findings suggest that the unfocused adoption and implementation of IT infrastructure will be a waste of resources and ultimately lead to failures for B2B system adoption as discussed earlier in Chapter Three. SME managers benefited from knowing which activities contribute most to improving SMEs' performance and ultimately efficiency. Hence, this research concludes that the readiness and external pressure with the understanding of some considerations about the other internal and external organisational factors are necessary to receive full benefits of the B2B system adoption in SMEs in Amman. However, the relative importance of these factors may change based on the local business conditions.

SMEs' performance improvement in terms of cost reduction is important since enterprises expect to receive technology benefits that exceed costs. Cost benefits involve reductions in both material and labor costs. While this research did not collect objective cost data for SMEs, cost information would be available to practicing SME managers to calculate the payback period or net present value (NPV), etc., which may be important to justify the investment in B2B systems. In addition, reduction in costs could include price-concessions from TPs for ordering on-line and labor-intensive activities that could be eventually automated.

SME efficiency improvements in the factor of inventory management and control was associated with cost reductions, such as inventory holding costs, the cost of scrap and returned goods. Furthermore, inventory reductions include raw material, work-in-process and finished goods. In addition, the inventory management and control or

quality of inventory include reduce error in the receipt and translation of TPs orders, returned goods and errors in documentation. The fully mediated effect of the PBP factor as one of the SME efficiency improvement factors is important to SME managers because it implies that they must invest in making changes to business processes before the full benefits of B2B systems are realized. The structured PBP are easier to automate and are therefore good candidates for improvement through B2B systems adoption. Hence, improvements in the performance and efficiency factors in this research ultimately lead to reduced costs quality of inventory management and control and PBP. These findings may help SME managers to prevent many of the failures of IT implementations discovered by Matta and Krieger (2001).

This research found that automating the PBP allows timely and accurate estimation of the material needs of the SMEs in Amman. Activities of PBP include placing and confirming order to and from TPs online, as well as checking of order status. As discussed earlier, these activities can be performed online through TPs' websites and/or through e-mail. In addition, SMEs' and TPs' activities involve the collection and processing of information about potential TPs. Due to the lack of the technical capability and judgment, which is not easy to automate, some level of human intervention is required to compare TPs' qualifications with SMEs' needs. The PBP activities include the documentation of incoming orders and the acceptance of goods: these processes may be less affected by B2B system adoption because they are less structured. This research also contributes to the literature and the practice of SME managers in Amman by presenting the following conclusions:

1. The B2B system adoption by SMEs in Amman has a positive influence on performance and efficiency improvement.
2. The external organisational factors such as readiness and external pressure from TPs appear to be more important to adopt B2B systems by SMEs in Amman than other factors.
3. Some of the factors in SMEs' performance improvement, such as productivity and costs appear to be more important to success than other factors.
4. The evidence suggests that some of factors in SMEs' efficiency improvement, such as PBP and operating efficiency are more important to SMEs' efficiency improvement than other factors.
5. The findings suggest that the effect of B2B system adoption on profitability is indirect, mediated by other factors such as productivity, costs and sales.
6. The three control variables; enterprise size, B2B system use duration and economic sector in this research have neutral effects on B2B system adoption by SMEs in Amman.
7. B2B system adoption can remove many of the competitive advantages of larger enterprises in Amman market and provide opportunities for SMEs.
8. Top management in SMEs and government support in Jordan realised the IT and EC system adoption form, hence, SMEs in Amman are forced to adopt B2B systems.

9. Results conclude that it is very believable that the B2B system adoption will condition minimal expenses (costs reduction), for example, the acquisition of simple technological equipment and employees training to use the system.
10. The benefits of B2B system adoption in SMEs include the effective way for SMEs in Amman to sell and advertise their products and services, improve communications with their TPs identify potential TPs.
11. Results that have been discussed and presented earlier conclude that the B2B system adoption is important for the ongoing survival of SMEs in Amman.

8.5 Contributions to the Literature

This research clarifies the literature through four contributions:

The first contribution is to extend previous research by being the first study to develop a continuous scale or model specifically measuring B2B system adoption by SMEs in the services and industrial sectors in Amman, which resulted in a strong positive influence and correlation in SMEs' performance and efficiency improvements. Most of the previous researchers such as Vehovar et al. (2001) used dichotomous factors to measure B2B system adoption. The major exception is Brews and Tucci (2004) who used a continuous scale to measure EC systems in general. Consequently, their scale is limited to a general examination of EC systems in services and industrial enterprises. The model or the relationships and correlations examined in this research extend the work of Brews and Tucci (2004) to specifically measure B2B system adoption in SMEs. This is important for two reasons; (I) Previous studies on correlating the B2B system

adoption and performance and efficiency have found that various forms of EC systems i.e. B2B, B2C and B2G are affected differently by technology and hence should be measured separately. (II) The effects of B2B system adoption appear to be moderated by the type of economic sectors, i.e. services and industrial, supporting a separate examination of each. Using this model and relationships, this research is able to explain 37 percent of the variance in performance and 45 percent in efficiency compared to the 12 percent improvement reported by Devaraj and Kohli (2003). These findings suggest that the model should be used in future research because it has greater explanatory power and strong construct validity. In addition, the findings in this research that concluded a strong positive influence and correlation between B2B system adoption and SMEs performance and efficiency disagree with the findings from Grey et al. (2005), Gefen (2004), SSMR (2002a; 2002b), Berryman and Heck (2001), Matta and Krieger (2001) and Kemerer and Sosa (1991) who concluded neutral or negative effects of the B2B system adoption on enterprises' performance. However, the findings in this research support the findings of Craighead and Laforge (2002), Toy (2001), Brynjolfsson and Smith (2000), Hitt and Brynjolfsson (1996), Iacovou et al. (1995) and Mukhopadhyay and Kekre (2002) whose found positive correlations and influence with some measures of performance and efficiency, including productivity, costs, PBP and inventory management and control.

The second contribution is that this is the first research to find that internal and external organisational factors are important to adoption of B2B systems by SMEs in Amman. The finding that internal and external organisational factors (i.e. external pressure, readiness, SMEs' strategic and SME managers perceptions) are important

because it implies that both factors must be measured to know the extent to which B2B systems are adopted.

The third contribution is that this research found that some of the performance and efficiency's factors are more important in explaining the variance in SMEs' performance and efficiency. This research found that costs, productivity, sales, PBP and operating efficiency are more important factors to the composition of performance and efficiency, which affected by B2B system adoption than other factors in the model. Previous studies reviewed as part of this thesis did not examine the relative importance of these factors.

The fourth contribution of this research is a methodological contribution provided by developing a model which simplifies the examination of the influence and the relationships among the internal and external organisational factors, the extent of the B2B system adoption and SME performance and efficiency improvements. In addition to simplifying the way the four factors of the internal and external organisational factors are measured, this research also simplifies the way performance and efficiency improvement are measured. Hence, the four factors comprising SME performance improvements and the three factors of SME efficiency improvements are presented as two separate factors. This is the first research to collectively measure all four performance factors and three efficiency factors as single reflective factors.

8.6 Recommendations

The following recommendations are made to SME managers in Amman.

1. SME managers in Amman should proceed to adopt B2B systems with the expectation that productivity, sales, costs, profits, PBP, inventory management and control and operating efficiency will improve. This is especially important for managers who must justify B2B system projects in terms of cost.
2. SME managers in Amman should first identify and plan for changes in structured business process that have the best chance for automation. Hence, the SME managers can expect improvements in performance and efficiency through a cost reduction in order tardiness with TPs.
3. SME managers in Amman who expect to receive full benefits of the B2B system adoption must invest and address activities that improve SME readiness such as IT infrastructure.
4. SME managers in Amman should first identify the type of information sharing that will most benefit SME performance and efficiency and then develop an infrastructure to support it. Otherwise, unnecessary or insufficient infrastructure may be adopted and extend the time it takes to realise performance and efficiency improvement benefits. The literature shows that many SMEs tend to adopt B2B systems widely with little consideration for how it will be used.
5. The findings suggest that SME managers in Amman must invest in B2B systems to achieve the adoption benefits.

8.7 Limitations

This research has three limitations.

The first limitation, this research tested the influence of B2B system adoption in SMEs in Amman on PBP as one of the efficiency factors without consideration for other business processes. These processes may include non-Internet based business processes as well as other Internet-based business systems such as TPs' relationship management and internal processes. Romano (2003) and Jukic et al. (2003) mentioned that TPs' relationship business processes, for example Electronic Commerce Customer Relationship Management (EC-CRM) involves elements of order fulfillment, outbound logistics and new products and services development as well as internal business processes that involve elements of order fulfillment, production, planning and control and revenue management. However, due to the length of the current questionnaire in this research, these factors should be developed in different samples and separate instruments.

The second limitation is non-Internet based forms of B2B systems such as EDI are not considered in this research. This was done internationally to isolate the effects of Internet based systems. Consequently, to obtain a more comprehensive evaluation of the influence of the B2B system adoption on SMEs performance and efficiency, Internet-EDI-type technologies should be included in the future studies.

The third limitation is that there are other factors of the performance and efficiency improvements that are not included in the performance and efficiency factors used in this research. These include lead-time, cycle time and order lateness, as well as metrics that measure SME business performance. Hence, to better evaluate the effects of

B2B system adoption on the SMEs, factors representing both operating and business performance could be included.

8.8 Directions for Future Research

The limitations discussed in the previous section provide opportunities for the extensions of this research.

Firstly, constructs for measuring TPs' relationships and the internal business processes should be developed and examined in an advanced model. Examining this model in this manner may provide a broader examination of the influence of the B2B system adoption, which may increase its generalisability. In addition, the new factors may account for some of the remaining error variance found in this research. This may increase the model fit, without loss of parsimony or power.

Secondly, the criterion performance factor was measured with only four of the factors found in the literature. Future studies could expand the construct to include a broader examination of operational and supply chain measures such as lead-time, equipment operating costs and coordination costs that are prevalent in the literature.

Thirdly, to better evaluate the moderating effects of the control variables stratified sampling should be conducted in selecting SMEs for future research. This allows for enterprises to be selected in a manner that facilitates equal size categories. Hence, this may allow for improved evaluation of the effects of the control variables on SMEs' performance and efficiency because the influence would not be masked due to small interview and questionnaire samples.

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Appendices

Appendix A: Interview and Survey Permission Letter and Questions

Interview Permission Letter

Name of Researcher: Anas A. Al-Bakri

PhD Candidate, School of Information Systems, Faculty of Business

University of Southern Queensland (USQ), Australia

Email: w0068352@mail.connect.usq.edu.au

Mobile: +61 2 (0)406833882

In order to assist the researcher in PhD research, entitled “The Adoption of Business-To-Business Systems by Small and Medium Enterprises (SMEs) in Amman and The Perceptions of its Influence on Performance and Efficiency”. I give Anas Al Bakri permission to use my interview with him in his research, and to provide information and other materials to be used in connection with the research, including my personal experiences, remarks, and recollections, as well as any documents that I may choose to give to the researcher.

I have been informed that the interview will not be used for any other purpose. I have also been informed that if I become uncomfortable at any time during the interview, I do not have to answer questions or I can ask to have the tape or video recorder (if used) turned off. In addition, in order to enable the researcher to develop the research in any manner that the researcher may deem best, I hereby release and discharge the researcher, from any and all claims, demands, or causes of action that I may have against him by reason of anything contained in the research, or any of the above uses, including any claims based on the right of privacy, the right of publicity, copyright, or any other right. I also acknowledge and agree that I am not entitled to receive any form payment from the researcher.

(Name of interviewee will not be identified in the published research)

Printed Name of person interviewed:

Date:

Signature:

INTERVIEW QUESTIONS

Q1: What is the main enterprise activity?

Q2: How many people are currently employed by your enterprise?

Q3: What is the approximate annual turnover of your enterprise?

Q4: Approximately how many computers does your enterprise have connected to the Internet?

Q5: Does your enterprise practice B2B systems or/and Internet?

Q6: Does your enterprise use the Internet for email, own company website, providing customer service/support and/or marketing/advertising?

Q7: What equipment do you use to access the Internet and B2B systems?

Q8: Does your enterprise use B2B systems for the following activities?

Supply chain management; local or/and global trading partners relationship management; product lifecycle management; enterprise resource planning.

Q9: How do you rate your level of knowledge and awareness in IT, Internet and B2B systems?

Level of expertise: Very experienced, fairly experienced, not very experienced.

Q10: What benefits do you expect to experience as a result of using the B2B systems?

Q11: What factors have led your enterprise to adopt B2B systems and to what extent have these factors been met?

Q12: Which B2B system adoption factors have translated into successful outcomes?

Q13: To what extent has your enterprise benefited as a result of using the Internet or B2B systems? Such as;

Raising/improving company profile, improving trading partners relationships/working together, keeping ahead of / up to date with competition, identifying cheapest telecom

supplier, reducing costs e.g. transaction and marketing, flexibility/convenience, other (please specify).....

Q14: Did you experience any problems when you first installed and started using the Internet and B2B systems? Such as; Difficulty getting connected / using equipment, equipment more costly than expected ,deciding which ISP / comparing cost, service, deciding on equipment specification, lack of information / advice / support on how to set up etc , other (please specify).

Q15: How concerned are you about performance and efficiency issues?

Q16: Do you expect that adoption of B2B systems by your enterprise has positive effects on performance?

Q17: Do you expect that adoption of B2B systems by your enterprise has positive effects on efficiency?

Q18: Do you expect that adoption of B2B systems by SMEs in Amman will have positive effects on performance and efficiency in your sector?

Q19: How concerned are you about the B2B system adoption by your local and global trading partners?

Q20: When selecting your ISP, what factors did you consider? Which, if any of following factors, did you consider most important?

Cost factors, content and advertising, technical support offered and/or reputation.

Q21: How concerned are you about the readiness of local trading partners that influence on B2B system adoption by your enterprise?

Q22: How concerned are you about the readiness of global trading partners that influence of adoption of B2B systems by your enterprise?

Survey Questionnaire

The Adoption of Business-To-Business Systems by Small and Medium Enterprises in Amman and the Perceptions of Its Influence on Performance and Efficiency

Dear Manager

The objective of this research project, entitled "The Adoption of Business-To-Business Systems by Small and Medium Enterprises (SMEs) in Amman and The Perceptions of its Influence on Performance and Efficiency", is to measure the extent of adoption and diffusion of B2B systems in small and medium enterprises in Amman through measuring the extent of using B2B systems and the attempt to expand these enterprises. The research project will investigate the obstacles to practicing B2B systems in small and medium enterprises in Amman. This research contributes by introducing some solutions for overcoming the barriers of practicing B2B systems in small and medium enterprises in Amman, and to increase their performance and efficiency.

I would appreciate your cooperation in filling out all the parts of this questionnaire, knowing that any collected information will be used for research purposes only.

If your company is interested in the results of this study please tick the following box and record your email address

Anas Al-Bakri

PhD Candidate, School of Information Systems, Faculty of Business

University of Southern Queensland (USQ), Australia

Email: w0068352@mail.connect.usq.edu.au

Mobile: +61 2 (0)406833882

Part One: General Information (Control Variables)

Please take some time to participate in this survey and give your views and experience with B2B system adoption. Depending on your experience and answers, it should take no longer than 20 minutes. The information you provide is completely confidential and will not be passed to any other parties. It will be used to identify issues of concern to small and medium enterprises in Amman.

This first part is concerned with the collection of information about your enterprise; please provide information about the following categories within the space provided:

Q1: The activity of enterprise:

Q2: Year of foundation

Q3: Enterprise capital

Q4: Number of employees

Q5: Number of branches

Q6: B2B Use Duration

Q7: Enterprise Sector

Part Two:

This part is to collect information about the factors that effect the adoption of B2B systems in SMEs in Amman. The five-point Likert scale is designed in the percentage for importance of factors and items. Please consider the following definitions in making your choices. Please choose only 1 answer per question.

(1) None: means that items are not affect the extent of B2B system adoption in your enterprise						
(2) < 25%: means that items are affect the extent of B2B system adoption in your enterprise, but less than 25% of importance factor						
(3) 25%-50%: means that items are affect the extent of B2B system adoption in your enterprise, but only 25%-50% of importance factor.						
(4) 51%-70%: means that items are affect the extent of B2B system adoption in your enterprise, but only 51%-70% of importance factor.						
(5) >70%: means that items are affect the extent of B2B system adoption in your enterprise, and more than 70% of importance factor.						
No	Question	5	4	3	2	1
Internal Organisational Factors (SMEs' Strategic in Practicing B2B Systems).						
1	The enterprise has telecommunication tools which enables it to practice B2B systems.					
2	The enterprise is seeking the development of its equipment to meet the new requirements to practice B2B systems.					
3	IT equipment helps the enterprise to expand its B2B systems transactions.					
4	Internet and other services are provided in the enterprise to practice B2B systems.					
5	The enterprise provides net lines that help in practicing B2B systems.					
6	The enterprise has the need to practice B2B systems.					
7	B2B systems one of the enterprise's goals.					
8	The enterprise considers B2B systems for integrating its non electronic transactions.					
9	The enterprise prefers the B2B systems to speed up processes with TPs e.g. transactions; recruitment, marketing etc.					
10	B2B systems assist the enterprise in raising company profile.					
11	The enterprise is keeping ahead of competition due to adoption of B2B systems.					
12	The enterprise can be up-to-date with competition through B2B systems.					

13	Adoption of B2B systems by the enterprise provides more trust of its transactions.					
14	B2B system adoption improves global competitiveness.					
15	The enterprise trusts B2B systems.					
16	The explanation of the mechanism of B2B systems increases trading partners' trust in your enterprise.					
Internal Organisational Factors (Perceptions of SME Managers).						
17	The enterprise has enough experience and knowledge to adopt B2B systems.					
18	The knowledge of B2B systems in the enterprise is produced by practicing the systems.					
19	Knowledge of e-exchanges with other enterprises helps in building experience.					
20	The consultation of IT enterprises helps in building the enterprise's experience.					
21	Experience of Internet Service Providers (ISPs) helps in solving the B2B system problem.					
22	The enterprise manager cares about providing staff with the capacity to deal with new technology.					
23	The capabilities and awareness of manager improved through continuous training.					
24	The databases are the only sources of information used to contact trading partners.					
25	The enterprise manager insists on employing new qualified staff.					
26	The perceptions and attitudes of enterprise manager of dealing with technology are distributed among all staff.					
27	The enterprise manager has own programs to improve his staff skills in IT.					
28	The enterprise managers care about providing databases for its staff.					
External Organisational Factors (Readiness of Local and Global Trading Partners).						
29	The local trading partners apply B2B systems in frequently transactions.					
30	The local trading partners exchange payments through electronic tools.					
31	Global and local trading partners' infrastructure is reliable to practice B2B systems.					
32	Global and local trading partners develop their equipment to reduce errors in electronic transactions.					
33	Global and local trading partners extend effort to increase the trust in their electronic transactions.					
External Organisational Factors (External Pressure by Local and Global Trading Partners).						
34	The distribution of B2B systems in global trading partners helps to adopt it.					

35	The high competence of other local trading partners encourages the adoption of B2B systems.					
36	The increase of B2B system adopters by local trading partners encourages your enterprise to adopt the systems.					
37	There is external pressure by local and global trading partners in the direction of adopting B2B systems by SMEs in Jordan.					
38	Global and local Telecom companies and Internet Providers' infrastructure are reliable to practice B2B systems.					
39	Global and local Telecom companies and Internet Providers develop their equipment to reduce errors in electronic transactions.					
40	Global and local Telecom companies and Internet Providers support for the enterprise's transactions in B2B systems.					
41	Global and local trading partners extend effort to increase the trust in their work.					
42	Global and local trading partners introduce offers to encourage B2B systems.					

Part Three:

This part aims to collect information about the perceptions of SME managers of B2B system adoption on SMEs performance and efficiency in Amman. The questions in this part of questionnaire evaluate the level of the B2B system adoption in SMEs by measuring the percentage of activities, which are conducted on-line. Please consider the following definitions in making your choices. Please choose only 1 answer per question.

(1) None: means that activities are not performed on-line in your enterprise.
(2) < 25%: means that activities are performed on-line in your enterprise, but less than 25% of total activities are conducted on-line.
(3) 25%-50%: means that activities are performed on-line in your enterprise, but only 25%-50% of total activities are conducted on-line.
(4) 51%-70%: means that activities are performed on-line in your enterprise, but only 51%-70% of total activities are conducted on-line.
(5) >70%: means that activities are performed on-line in your enterprise, and more than 75% of total activities are conducted on-line.

No	Question	5	4	3	2	1
Extent of B2B System Adoption in SMEs (Frequency of E-Transactions).						
43	Majority of sales activity and transactions in your enterprise are performed on-line					
44	Majority of your enterprise orders are placed on-line with counterparts.					
45	Percentage of employees which communicate within enterprise on-line.					
46	Identifies the needs for goods and services in your enterprise are performed on-line.					
47	Internal accounting as reporting and analysis in your enterprise are performed on-line.					
Extent of B2B System Adoption in SMEs (Practicing B2B Systems with Local and Global Trading Partners).						
48	Percentages of employees in your enterprise which are communicate with trading partners on-line.					
49	Percentage of your enterprise to accessed and checked trading partners delivery status reports on-line.					
50	Percentage of your enterprise purchase transactions and confirms orders to and from trading partners are performed on-line.					
51	Your enterprise collects feedback from trading partners on-line.					
52	Percentage of your enterprise sales volume is generated on-line with trading partners.					
53	Percentage of your enterprise payments with trading partners are performed on-line					
<p>The next section in this part seeks to discover the degree to which your enterprise's performance and efficiency were improved by adopting B2B systems.</p> <p>Please consider the overall percentage of the changes that took place beginning in the first year of adoption through the present period.</p> <p>Please consider the following definitions in making your choices. Please choose only 1 answer per question.</p>						

(1) None = ‘Did Not Change’: means that B2B system adoption did not change your enterprise performance and efficiency.
(2) <25% = ‘Changed Slightly’: means that B2B system adoption was used to make relatively minor changes in your enterprise performance and efficiency.
(3) 25%-50% = ‘Changed Moderately’: means that B2B system adoption was used to make relatively important changes in your enterprise performance and efficiency – but most of existing process was left intact.
(4) 51%-70% = ‘Changed Significantly’: means that B2B system adoption was used to make relatively large changes in your enterprise performance and efficiency – changing most of the existing process.
(5) >70% = ‘Changed Radically’: means that B2B system adoption was used to make completely changes and re-engineer existing in your enterprise performance and efficiency.

Improvements in Performance in SMEs. Productivity, Sales, Profitability and Costs.

54	Adoption of B2B systems has improved the productivity in your enterprise.					
55	Higher competitiveness due to adoption of B2B systems improves the enterprise productivity.					
56	Higher competition through B2B system adoption leads to expansion of enterprise productivity.					
57	Adoption of B2B systems has increased sales in your enterprise.					
58	Majority of sales activity in your enterprise are performed through B2B systems.					
59	Adoption of B2B systems assists the enterprise in raising the profit.					
60	Majority of your enterprise revenue activity is performed through B2B systems.					
61	Adoption of B2B systems has reduced inventory costs in your enterprise.					
62	Adoption of B2B systems has reduced the cost of production & labor in your enterprise.					
63	Running and maintenance of B2B systems is more costly than expected.					
64	User support and equipment of B2B system adoption are more costly than expected.					
65	B2B system adoption has improved the performance in your enterprise.					

Improvements in Efficiency in SMEs. Operation Efficiency, Inventory Management and Control and Procurement Business Process.

66	Adoption of B2B systems has improved the operation efficiency in your enterprise.					
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67	Adoption of B2B systems has reduced the frequency of mistakes in the receipt and translation of trading partners orders in your enterprise.					
68	Adoption of B2B systems has improved your enterprise on-time delivery to and from trading partners.					
69	Adoption of B2B systems has improved the inventory management and control in your enterprise.					
70	Your enterprise's databases include information about the inventory quantities.					
71	Your enterprise employees benefit from these databases to speed up the enterprise's transactions and inventory control.					
72	Adoption of B2B systems has improved the procurement business process in your enterprise.					
73	Your enterprise prefers the B2B systems to speed up the procurement business processes with trading partners.					
74	Adoption of B2B systems has improved the work-in-process (WIP) in your enterprise.					
75	Adoption of B2B systems has improved the efficiency in your enterprise.					

Appendix B: The Economic Sectors in Jordan and their Contributions to GDP

Table B.1
Economic Sectors in Jordan and Registered Enterprises

Sector	Number of Registered Enterprises	Capitalization Market (JD million)	% of Total
Trade	175775	904.6	49.5
Services	120188	333.8	33.9
Industrial	55377	394.9	15.6
Construction	2335	112.1	0.7
Agriculture	376	4.6	0.3
Total	354051	1750.1	100

Table B.2
The Economic Sectors in Jordan and their Contributions to GDP

Sector	GDP %
Industrial	18
Services	17
Trade	52
Agriculture	11
Construction	2

Table B.3
Distribution of 500 Questionnaires

Size / Sector	Services	Industrial	Total
Small	250	150	400
Medium	50	50	100
Total	300	200	500

Appendix C: The Indicators of IT and IS in Jordan

Table C.1
The Indicators of IT and IS in Jordan

Criterion	Number/ Percentage
Number of Individual Internet Participants	70000
Percentage of Computer Owners	4%
The Percentage of Internet Users	4.7%
Number of Internet Providing Companies (IPs)	11
Number of Fixed Phones Lines	733000
Percentage of Mobile Users	22%
Number of Companies for Web Design	50

Appendix D: Dimensions and Definitions of Factors

Table D.1
Dimensions of Procurement Business Process (PBP)

Identifies the needs for products and services
Communicates needs for products and services from and to TPs
Qualifies TPs
Confirms orders from and to TP

Source: Developed for this research from Mukhopadhyay and Kekre (2002).

Table D.2
Items of Improvements in Performance

Reduced your enterprise direct labor cost, administration and production costs (Costs- V10).
Improved your enterprise on-time-delivery performance to your TPs (Sales- V8).
Reduced the frequency of returned products from your TPs, due to quality issues (Productivity and Sales- V7, V8).
Reduced the number of errors in transactions with your TPs due to products specifications, accounting, pricing, and quantities (Productivity, Sales, Profits, and Costs- V7,V8,V9,V10)

Source: Developed for this research from Iyer, et al. (2004); Kim, et al. (2006).

Table D.3
Items of Operation Efficiency

Reduced Raw material or component inventory carried by your enterprise
Reduced finished goods inventory carried by your enterprise
Reduced the number of errors in decision making process

Source: Developed for this research from Iyer, et al. (2004); Kim, et al. (2006).

Appendix E: Descriptive Statistics for the Interview and Questionnaire Sample

E1.

Interview Sample Frame and Distribution

Size / Sector	Services	%	Industrial	%	# of Total SMEs	Total %
Small	3	30	2	20	5	50
Medium	3	30	2	20	5	50
Total	6	60	4	40	10	100

E2.

Questionnaire Population Demographics by Enterprise Size

No. Employees	Services Sector	Industrial Sector	Total Number in Population	%
1-4	94,909	40,676	135,585	95.2
5-19	2,550	4,230	6,780	4.8
Total Number in Population	97,459	44,906		
%	68.5	31.5		100

E3.

Questionnaire Sample Distribution

Size \ Sector	Services	Sample % of total	Industrial	Sample % of total	Total	%
Small	250	62.5	150	37.5	400	80
Medium	50	50	50	50	100	20
Total	300		200		500	
%	60		40			100

E4.

Questionnaire Sample Size

	Number	Percentage
Contacted SMEs	500	
Respondents (Survey)	368	73.6

E5.

Questionnaire Sample Demographics by Size and Sector

Enterprise Size	Sector						Total	%
	Services			Industrial				
	Number	Respondents	%	Number	Respondents	%		
Small (1-4 employee)	250	218	87.2	150	107	71.3	325	81.3
Medium (5-19 employee)	50	15	30	50	28	56	43	43
Total	300	233	77.6	200	135	67.5	368	73.6

E6.

Non-Responders by Sector and Size from Questionnaire

Size	Sector	# of Non Respondents	# of Respondents	% of Non- Respondents
Small	Services	25	218	11.4
	Industrial	28	107	26.1
Medium	Services	8	15	53.3
	Industrial	14	28	50
Total		75	368	20.4

E7.

Factor Loadings – Ten Factors for B2B System Adoption

Factor	Items	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Internal Organisational Factors	1	0.89	0.05	0.49	0.29	0.14	0.12	0.01	0.02	0.13	0.08
	2	0.90	0.19	0.12	0.06	0.18	0.22	0.13	0.14	0.22	0.14
	3	0.89	0.10	0.35	0.07	0.16	0.09	0.12	0.25	0.05	0.22
	4	0.90	0.24	0.26	0.09	0.12	0.07	0.22	0.12	0.04	0.23
	5	0.79	0.39	0.28	0.04	0.02	0.06	0.25	0.22	0.08	0.15
	6	0.87	0.11	0.30	0.06	0.03	0.21	0.08	0.24	0.05	0.13
	7	0.87	0.16	0.24	0.01	0.28	0.05	0.17	0.31	0.06	0.31
	8	0.78	0.05	0.25	0.12	0.09	0.26	0.04	0.35	0.27	0.16
	9	0.89	0.03	0.41	0.12	0.15	0.07	0.28	0.17	0.29	0.19
	10	0.78	0.17	0.49	0.11	0.22	0.09	0.15	0.41	0.24	0.02
	11	0.83	0.13	0.32	0.03	0.12	0.04	0.09	0.36	0.16	0.31
	12	0.82	0.14	0.35	0.18	0.14	0.24	0.12	0.18	0.22	0.27
	13	0.98	0.15	0.26	0.25	0.19	0.09	0.22	0.25	0.25	0.12
	14	0.85	0.06	0.28	0.09	0.22	0.01	0.13	0.09	0.08	0.14
	15	0.78	0.07	0.30	0.11	0.25	0.16	0.02	0.11	0.14	0.22
	16	0.89	0.09	0.24	0.18	0.24	0.05	0.12	0.18	0.24	0.05
	17	0.72	0.14	0.25	0.19	0.18	0.03	0.22	0.19	0.28	0.06
	18	0.82	0.16	0.22	0.22	0.07	0.07	0.25	0.22	0.11	0.07
	19	0.77	0.12	0.22	0.31	0.01	0.13	0.04	0.31	0.26	0.19
	20	0.72	0.09	0.24	0.19	0.12	0.16	0.38	0.17	0.15	0.24
	21	0.74	0.02	0.31	0.14	0.02	0.19	0.07	0.12	0.13	0.06
	22	0.89	0.01	0.35	0.27	0.02	0.22	0.11	0.21	0.27	0.25
	23	0.95	0.06	0.22	0.08	0.16	0.11	0.04	0.13	0.15	0.09
	24	0.83	0.02	0.29	0.21	0.06	0.17	0.09	0.17	0.26	0.01
	25	0.85	0.07	0.42	0.15	0.08	0.12	0.11	0.12	0.07	0.24
	26	0.82	0.05	0.40	0.29	0.02	0.14	0.18	0.01	0.19	0.29
	27	0.73	0.04	0.25	0.21	0.31	0.22	0.02	0.09	0.12	0.11
	28	0.91	0.03	0.38	0.24	0.09	0.15	0.31	0.08	0.14	0.02
External Organisational Factors	29	0.12	0.70	0.32	0.09	0.08	0.08	0.04	0.22	0.02	0.25
	30	0.15	0.76	0.21	0.11	0.12	0.05	0.09	0.25	0.23	0.14
	31	0.22	0.76	0.14	0.06	0.14	0.14	0.11	0.08	0.12	0.18
	32	0.32	0.78	0.19	0.15	0.22	0.16	0.06	0.15	0.14	0.07
	33	0.15	0.89	0.22	0.04	0.23	0.18	0.05	0.22	0.22	0.31
	34	0.16	0.86	0.25	0.19	0.15	0.19	0.02	0.12	0.23	0.12
	35	0.09	0.77	0.28	0.11	0.04	0.22	0.05	0.22	0.15	0.02
	36	0.01	0.77	0.17	0.16	0.09	0.31	0.09	0.15	0.24	0.16
	37	0.08	0.79	0.41	0.15	0.11	0.17	0.21	0.04	0.09	0.12
	38	0.05	0.87	0.36	0.24	0.06	0.12	0.04	0.08	0.29	0.11
	39	0.14	0.85	0.18	0.29	0.05	0.26	0.09	0.17	0.16	0.02
	40	0.16	0.75	0.25	0.11	0.03	0.18	0.10	0.33	0.15	0.23
	41	0.18	0.76	0.17	0.06	0.18	0.31	0.06	0.02	0.03	0.41
	42	0.02	0.98	0.04	0.09	0.01	0.12	0.22	0.17	0.24	0.15

Extent of B2B System Adoption	43	0.41	0.29	0.86	0.21	0.15	0.37	0.25	0.22	0.25	0.22
	44	0.49	0.33	0.86	0.35	0.35	0.41	0.34	0.29	0.32	0.39
	45	0.32	0.27	0.86	0.38	0.16	0.36	0.19	0.28	0.22	0.28
	46	0.35	0.12	0.91	0.22	0.12	0.18	0.22	0.12	0.40	0.16
	47	0.26	0.18	0.85	0.24	0.25	0.25	0.31	0.14	0.31	0.19
	48	0.28	0.19	0.73	0.12	0.08	0.29	0.17	0.22	0.35	0.22
	49	0.23	0.33	0.72	0.28	0.19	0.11	0.12	0.23	0.22	0.03
	50	0.24	0.34	0.87	0.15	0.17	0.18	0.12	0.15	0.17	0.17
	51	0.25	0.35	0.82	0.24	0.15	0.17	0.22	0.33	0.41	0.32
	52	0.12	0.22	0.86	0.16	0.18	0.22	0.25	0.31	0.36	0.14
	53	0.22	0.21	0.86	0.08	0.17	0.23	0.28	0.16	0.18	0.24
Productivity	54	0.05	0.16	0.18	0.78	0.15	0.17	0.22	0.19	0.25	0.25
	55	0.14	0.18	0.26	0.79	0.12	0.41	0.41	0.22	0.29	0.12
	56	0.28	0.06	0.42	0.87	0.09	0.36	0.23	0.31	0.11	0.22
Sales	57	0.02	0.17	0.12	0.41	0.86	0.19	0.29	0.17	0.11	0.23
	58	0.01	0.22	0.16	0.25	0.89	0.22	0.18	0.12	0.08	0.15
Profitability	59	0.02	0.21	0.12	0.29	0.22	0.75	0.08	0.14	0.15	0.04
	60	0.31	0.06	0.35	0.33	0.14	0.71	0.16	0.22	0.13	0.29
Costs	61	0.04	0.09	0.34	0.27	0.19	0.23	0.89	0.15	0.18	0.11
	62	0.19	0.33	0.38	0.22	0.11	0.15	0.88	0.06	0.13	0.06
	63	0.21	0.37	0.22	0.18	0.06	0.14	0.75	0.09	0.12	0.27
	64	0.06	0.12	0.24	0.26	0.22	0.09	0.71	0.22	0.18	0.11
	65	0.15	0.18	0.26	0.28	0.25	0.11	0.87	0.17	0.04	0.19
Operation Efficiency	66	0.01	0.12	0.32	0.23	0.10	0.06	0.22	0.85	0.19	0.33
	67	0.39	0.23	0.41	0.21	0.08	0.05	0.25	0.91	0.11	0.27
	68	0.12	0.15	0.29	0.35	0.15	0.22	0.19	0.89	0.26	0.22
Inventory Management & Control	69	0.01	0.07	0.19	0.34	0.16	0.05	0.33	0.18	0.86	0.22
	70	0.05	0.08	0.33	0.42	0.19	0.04	0.27	0.23	0.77	0.25
	71	0.18	0.03	0.27	0.26	0.22	0.08	0.12	0.15	0.85	0.28
Procurement Business Process	72	0.24	0.08	0.18	0.27	0.31	0.07	0.17	0.04	0.15	0.89
	73	0.19	0.08	0.16	0.24	0.17	0.10	0.41	0.19	0.24	0.87
	74	0.01	0.05	0.42	0.33	0.25	0.12	0.36	0.11	0.22	0.91
	75	0.06	0.01	0.12	0.25	0.04	0.12	0.18	0.33	0.12	0.88

**E8.
Reliability Statistics**

Factors (First and Second – Order Factors)	# of Items	Cronbach's Alpha (α)
SMEs' Strategic in Practicing B2B Systems	16	0.960
Perceptions of SME Managers	12	0.841
Readiness of TPs	5	0.792
External Pressure by TPs	9	0.833
Frequency of e-transactions	5	0.864
Practicing B2B with TPs	6	0.791
Productivity	4	0.836
Sales	2	0.923
Profitability	2	0.891
Costs	4	0.929
Operation Efficiency	4	0.793
Inventory Management & Control	3	0.844
Procurement Business Process	3	0.921

E9.

Factor Loadings for the Internal and External Organisational Factors

Factor	Item	Factor Loadings				Eigenvalue	% of Variance
		1	2	3	4		
Internal Organisational Factors					7.644	47.775	
SMEs' Strategic in Practicing B2B Systems	1	.896					
	2	.908					
	3	.896					
	4	.909					
	5	.796					
	6	.874					
	7	.876					
	8	.783					
	9	.896					
	10	.788					
	11	.839					
	12	.824					
	13	.983					
	14	.856					
	15	.783					
	16	.896					
SME Managers' Perceptions	17		.723				
	18		.823				
	19		.776				
	20		.726				
	21		.744				
	22		.891				
	23		.955				
	24		.834				
	25		.856				
	26		.822				
	27		.733				
	28		.911				
External Organisational Factors					2.499	15.616	
Readiness of TPs	29			.705			
	30			.761			
	31			.765			
	32			.789			
	33			.897			
External Pressure by TPs	34				.860		
	35				.775		
	36				.778		
	37				.795		
	38				.879		
	39				.855		
	40				.750		
	41				.760		
	42				.980		

E10.

Factor Loadings for the Extent of B2B System Adoption

Factor	Item	Factor Loadings		Eigenvalue	% of Variance
		1	2		
Extent of B2B System Adoption				1.564	9.77
Frequency of e-Transactions	43	.866			
	44	.864			
	45	.860			
	46	.911			
	47	.859			
Practicing B2B Systems with TPs	48		.733		
	49		.723		
	50		.876		
	51		.826		
	52		.868		
	53		.862		

E11.

Factor Loadings for SMEs' Performance Improvement

Factor	Item	Factor Loadings				Eigenvalue	% of Variance
		1	2	3	4		
SMEs' Performance Improvement						2.338	15.232
Productivity	54	.785					
	55	.793					
	56	.875					
Sales	57		.868				
	58		.895				
Profitability	59			.755			
	60			.710			
Costs	61				.894		
	62				.886		
	63				.755		
	64				.710		
	65				.877		

E12.

Factor Loadings for SMEs' Efficiency Improvement

Factor	Item	Factor Loadings			Eigenvalue	% of Variance	
		1	2	3			
SMEs' Efficiency Improvement						1.055	6.525
Operation Efficiency	66	.850					
	67	.913					
	68	.895					
Inventory Management and Control	69		.862				
	70		.777				
	71		.855				
Procurement Business Process	72			.899			
	73			.878			
	74			.910			
	75			.887			

E13.

Pearson Correlation Coefficient between Items A cross Sample Groups

Factor	Items	SS & SI	MS & MI	SMS & SMI	SSI & MSI
		Correlation	Correlation	Correlation	Correlation
F1	1	0.961	0.998	0.855	0.856
	2	0.960	0.897	0.997	0.878
	3	0.971	n/a	0.980	0.879
	4	0.973	0.987	0.784	n/a
	5	0.957	0.895	0.999	0.659
	6	0.998	0.658	0.975	0.899
	7	0.982	0.779	0.984	0.952
	8	0.782	0.794	0.985	0.772
	9	0.985	0.856	0.876	0.935
	10	0.856	0.659	0.874	0.876
	11	0.977	0.899	0.855	0.937
	12	0.947	0.892	0.783	0.927
	13	0.658	0.980	0.896	0.798
	14	0.955	0.789	0.788	0.977
	15	0.715	0.560	0.704	0.982
	16	0.953	0.999	0.789	0.875
	17	0.840	0.874	0.934	0.780
	18	0.915	0.876	0.956	0.836
	19	0.855	0.783	0.950	0.988
	20	0.750	0.896	0.945	0.972
	21	0.660	0.788	0.920	0.782
	22	0.980	0.839	0.999	0.965
	23	0.830	0.824	0.975	0.846
	24	0.834	0.983	0.984	0.977
	25	0.760	0.844	0.985	0.947
	26	0.872	0.955	0.876	0.658
	27	0.744	0.999	0.954	0.955
	28	0.891	0.975	0.986	0.789

F2	29	0.856	0.876	0.988	0.975
	30	0.822	0.778	0.849	0.998
	31	0.733	0.888	0.910	0.897
	32	0.911	n/a	0.850	n/a
	33	0.875	0.856	0.992	0.987
	34	0.997	0.839	0.786	0.985
	35	0.980	0.824	0.998	0.876
	36	0.784	0.983	0.975	0.874
	37	0.999	0.844	0.985	0.876
	38	0.975	0.955	0.984	0.783
	39	0.984	0.987	0.875	0.896
	40	0.985	0.958	0.873	0.788
	41	0.876	0.668	0.879	0.839
	42	0.874	0.855	0.789	0.824
F3	43	0.855	0.997	0.897	0.983
	44	0.997	0.980	0.780	0.844
	45	0.980	0.889	0.836	0.955
	46	0.875	0.897	0.826	0.999
	47	0.873	0.856	0.983	0.975
	48	0.879	0.878	0.865	0.984
	49	0.789	0.879	0.972	0.985
	50	0.897	0.856	0.892	0.856
	51	0.999	0.897	0.980	0.990
	52	0.975	0.942	0.830	0.880
	53	0.984	0.978	0.834	0.998

F4	54	0.985	0.952	0.760	0.982
	55	0.876	0.772	0.872	0.782
	56	0.874	0.935	0.744	0.985
	57	0.876	0.876	0.891	0.856
	58	0.783	0.937	0.955	0.977
	59	0.896	0.978	0.834	0.947
	60	0.788	0.952	0.856	0.658
	61	0.839	0.772	0.822	0.955
	62	0.999	0.935	0.733	0.998
	63	0.975	0.658	0.911	0.658
	64	0.984	0.955	0.875	0.955
F5	65	0.985	0.715	0.842	0.715
	66	0.876	0.953	0.864	0.953
	67	0.983	0.850	0.822	0.835
	68	0.844	0.785	0.792	0.830
	69	0.955	0.830	0.970	0.834
	70	0.990	0.834	0.957	0.760
	71	0.885	0.760	0.998	0.891
	72	0.745	0.895	0.982	0.920
	73	0.765	0.862	0.782	0.799
	74	0.892	0.798	0.985	0.866
	75	0.843	0.874	0.882	0.872

E14.
Pearson Correlation Coefficient between
Factors A cross Sample Groups

Factors		SS & SI	MS & MI	SMS & SMI	SSI & MSI
		Correlation	Correlation	Correlation	Correlation
F1	1	0.991	0.789	0.985	0.759
	2	0.792	0.955	0.781	0.973
F2	3	0.875	0.957	0.847	0.985
	4	0.770	0.994	0.877	0.978
F3	5	0.890	0.879	0.940	0.955
	6	0.893	0.826	0.956	0.978
F4	7	0.892	0.962	0.984	0.987
	8	0.890	0.986	0.896	0.998
	9	0.758	0.777	0.927	0.975
F5	10	0.794	0.749	0.993	0.984
	11	0.775	0.966	0.894	0.873
	12	0.890	0.939	0.786	0.789
	13	0.998	0.975	0.978	0.780

E15.

Descriptive Statistics for 75 Items from 368 SMEs

Factors	Items	Mean	SD	Skew	Kurtosis	Min	Max
1	1	2.40	0.84	0.65	-0.09	1.0	5.0
	2	4.00	1.11	-0.70	-0.82	1.0	5.0
	3	3.08	1.06	0.55	-0.78	1.0	5.0
	4	2.90	0.87	0.30	-0.02	1.0	5.0
	5	1.55	0.55	0.70	-0.07	1.0	3.45
	6	2.11	0.32	2.51	4.50	1.75	5.0
	7	3.66	1.25	-0.39	-1.15	0.60	5.0
	8	3.05	1.10	0.48	-0.74	1.0	5.0
	9	2.75	0.92	0.25	0.04	1.0	5.0
	10	1.44	0.55	0.90	-0.13	1.0	3.0
	11	4.11	1.16	-0.88	-0.55	1.0	5.0
	12	4.05	1.18	-0.87	0.56	1.0	5.0
	13	1.75	0.81	1.25	1.35	1.0	4.0
	14	2.65	1.25	0.60	-0.70	1.0	5.0
	15	2.75	1.40	0.42	-1.14	1.0	5.0
	2	16	2.70	1.35	0.55	-0.95	1.0
17		2.11	0.31	1.50	0.49	1.0	5.0
18		2.30	1.20	0.82	0.08	1.0	5.0
19		1.55	0.85	1.70	2.45	1.0	5.0
20		1.50	0.85	1.80	2.45	1.0	4.0
21		3.00	1.30	0.30	-1.10	1.0	5.0
22		3.35	1.60	-0.25	-1.60	1.0	5.0
23		2.25	1.35	1.05	-0.15	1.0	5.0
24		2.55	1.00	0.75	0.35	1.0	5.0
25		2.55	0.99	0.70	0.40	1.0	5.0
26		2.65	1.11	0.60	-0.25	1.0	5.0
27		2.50	1.38	0.60	-0.80	1.0	5.0
28		2.25	1.40	0.90	-0.50	1.0	5.0
3	29	2.25	1.20	0.90	0.00	1.0	5.0
	30	1.56	0.90	1.45	0.98	1.0	5.0
	31	1.50	0.85	1.75	2.15	1.0	5.0
	32	2.15	1.20	0.80	-0.45	1.0	5.0
	33	3.10	1.15	-0.04	-0.77	1.0	5.0
4	34	2.50	1.25	0.50	-0.88	1.0	5.0
	35	1.60	0.80	1.20	0.60	1.0	4.0
	36	1.70	0.98	1.20	0.20	1.0	4.0
	37	2.10	1.04	0.80	0.05	1.0	5.0
	38	2.55	1.00	0.76	0.30	1.0	5.0
	39	2.50	0.97	0.71	0.42	1.0	5.0
	40	2.66	1.11	0.57	-0.25	1.0	5.0
	41	2.56	1.35	0.60	-0.80	1.0	5.0
	42	1.77	0.93	1.07	0.21	1.0	5.0
	5	43	1.75	0.93	1.05	0.25	1.0
44		2.33	1.38	0.84	-0.50	1.0	5.0
45		2.25	1.20	0.89	0.00	1.0	5.0
46		1.55	0.90	1.45	0.98	1.0	4.0
47		1.50	0.85	1.75	2.15	1.0	4.0

6	48	2.15	1.20	0.80	0.45	1.0	5.0
	49	3.10	1.15	0.05	0.77	1.0	5.0
	50	2.65	1.35	0.25	-1.10	1.0	5.0
	51	3.07	1.20	-0.20	-0.91	1.0	5.0
	52	2.50	1.25	0.41	-0.88	1.0	5.0
	53	1.70	0.98	1.20	0.21	1.0	4.04
7	54	2.10	1.05	0.80	0.05	1.0	5.0
	55	2.50	1.55	1.10	0.60	1.0	5.0
	56	2.50	1.55	1.01	0.30	1.0	5.0
8	57	2.05	1.40	1.38	1.00	1.0	4.0
	58	2.40	1.75	1.20	0.55	1.0	5.0
9	59	1.70	0.90	1.12	0.35	1.0	4.04
	60	2.80	1.75	1.16	0.53	1.0	5.0
10	61	1.90	1.40	1.70	1.92	1.0	7.0
	62	3.24	2.09	0.70	-0.80	1.0	7.0
	63	2.27	1.80	1.47	1.16	1.0	7.0
	64	3.69	2.16	0.44	-1.26	1.0	7.0
	65	3.00	1.92	6.92	-0.23	1.0	7.0
11	66	3.88	2.09	0.35	-1.25	1.0	7.0
	67	2.75	2.80	1.45	0.65	1.0	5.0
	68	2.12	1.42	1.75	-1.15	1.0	4.0
12	69	3.65	1.55	0.80	-0.74	1.0	5.0
	70	3.03	1.41	0.05	0.04	1.0	4.04
	71	2.70	1.65	0.25	-0.13	1.0	5.0
13	72	1.45	0.80	-0.20	-0.65	1.0	7.0
	73	4.10	1.75	0.41	0.56	1.0	7.0
	74	4.02	1.30	1.20	1.25	1.0	7.0
	75	1.70	1.75	0.80	1.32	1.0	7.0

E16.

Descriptive Statistics for 75 Items from the Final 345 SMEs

Factors	Items	Mean	SD	Skew	Kurtosis	Min	Max
1	1	2.38	0.83	-0.66	-0.97	1.0	4.0
	2	4.00	1.10	-0.75	-0.75	0.0	4.0
	3	2.00	0.06	-0.70	0.05	0.0	1.0
	4	1.95	0.20	-1.55	1.92	0.0	1.0
	5	1.45	0.50	0.19	-1.97	0.0	1.0
	6	2.1	0.30	2.55	4.55	0.7	4.0
	7	3.70	1.20	-0.40	-1.00	0.0	4.0
	8	1.98	0.19	-0.37	0.88	0.0	1.0
	9	1.90	0.29	0.02	1.04	0.0	1.0
	10	1.39	0.50	0.50	-1.75	0.0	1.0
	11	4.09	1.15	-0.85	-0.70	0.0	4.0
	12	4.04	1.16	-0.82	-0.60	0.0	4.0
	13	1.70	0.75	1.30	1.70	0.0	3.0
	14	2.60	1.20	0.65	-0.52	0.0	4.0
	15	2.70	1.40	0.45	-1.04	0.0	4.0
	16	2.65	1.30	0.62	-0.75	0.0	4.0

2	17	2.10	0.30	0.54	-1.73	0.0	2.0
	18	2.30	1.19	0.77	-0.15	0.0	4.0
	19	1.60	0.87	1.60	2.20	0.0	4.0
	20	1.50	0.85	1.73	2.98	0.0	3.0
	21	3.02	1.33	0.25	-0.16	0.0	4.0
	22	3.40	1.60	-0.29	-1.61	0.0	4.0
	23	2.15	1.20	1.20	0.65	0.0	4.0
	24	2.50	0.95	0.75	0.50	0.0	4.0
	25	2.51	0.93	0.70	0.47	0.0	4.0
	26	2.60	1.10	0.60	-0.25	0.0	4.0
	27	2.42	1.30	0.95	-0.15	0.0	4.0
3	28	2.20	1.30	0.95	-1.15	0.0	1.0
	29	2.50	1.20	0.85	-0.80	0.0	4.0
	30	1.60	0.90	1.40	0.80	0.0	3.0
	31	1.50	0.80	1.70	2.15	0.0	3.0
	32	2.20	1.20	0.70	-0.55	0.0	4.0
4	33	2.99	1.10	0.02	-0.66	0.0	4.0
	34	2.66	1.22	0.66	-0.53	0.0	4.0
	35	2.59	0.90	0.55	-0.15	0.0	4.0
	36	2.66	1.02	0.67	-0.17	0.0	4.0
	37	1.60	0.84	1.63	2.20	0.0	4.0
	38	2.15	1.22	1.22	0.65	0.0	4.0
	39	2.49	0.94	0.74	0.49	0.0	4.0
	40	2.52	0.92	0.70	0.47	0.0	4.0
	41	2.60	1.09	0.57	-0.23	0.0	4.0
	42	2.42	1.28	0.68	-0.52	0.0	4.0
5	43	2.18	1.20	0.71	-0.55	0.0	4.0
	44	2.97	1.16	0.02	-0.65	0.0	4.0
	45	2.55	1.28	0.30	-1.06	0.0	4.0
	46	3.10	1.19	-0.25	-0.80	0.0	4.0
	47	3.02	1.16	-0.17	-0.85	0.0	4.0

6	48	2.45	1.20	0.42	-0.80	0.0	4.0
	49	1.66	0.80	1.16	0.50	0.0	4.0
	50	1.70	0.95	1.20	0.22	0.0	4.0
	51	2.03	1.03	0.90	0.45	0.0	4.0
	52	2.50	1.65	1.08	0.60	0.0	4.0
	53	2.50	1.50	1.00	0.40	0.0	4.0
7	54	1.99	1.33	1.44	1.28	0.0	4.0
	55	2.30	1.69	1.31	0.91	0.0	4.0
	56	1.70	0.92	1.07	0.17	0.0	5.0
8	57	2.66	1.67	1.30	0.98	0.0	4.0
	58	1.80	1.30	1.90	2.75	0.0	4.0
9	59	3.09	1.99	0.85	-0.50	0.0	5.0
	60	2.15	1.67	1.54	1.55	0.0	4.0
10	61	3.55	2.09	0.55	-1.04	0.0	6.0
	62	2.96	1.91	0.92	-0.22	0.0	6.0
	63	3.75	2.01	0.42	-1.05	0.0	6.0
	64	2.14	1.65	1.50	1.55	0.0	6.0
	65	3.52	2.07	0.56	-1.02	0.0	6.0
11	66	3.73	2.04	0.44	-1.04	0.0	6.0
	67	2.65	0.98	0.54	-0.04	0.0	4.0
	68	2.65	0.99	0.56	0.41	0.0	4.0
12	69	2.55	0.90	0.50	-0.14	0.0	4.0
	70	2.66	1.00	0.66	-0.16	0.0	4.0
	71	1.78	0.95	1.05	0.15	0.0	1.0
13	72	1.77	0.94	1.05	0.16	0.0	1.0
	73	1.70	2.38	0.82	2.05	-1.96	0.0
	74	2.03	4.02	1.07	-0.72	-0.77	0.0
	75	2.50	1.98	0.06	-0.72	0.06	0.0

E17.

Fit Indices and Statistics for SFM

Statistic	Single factor
Chi – Square	335.30
Degrees Freedom (DF)	367
Mardia’s Normalised Estimate	9.20
Free Parameters	27
Fixed Parameters	16
Comparative Fit Index (CFI-ML)	0.74
CFI-Robust	0.74
Standard Root Mean-Square Residual (SRMR)	0.092
Root Mean Square Error of Approximation (RMSEA-ML)	0.18
RMSEA-Robust	0.12

E18.

Fit Indices and Statistics for Five-Factor (CFA) Measurement Model

Statistic Name	Five Factor Statistics Results
Chi – Square	182.85
DF	344
Mardia’s Normalised Estimate	9.10
Free Parameters	35
Fixed Parameters	20
CFI-ML	0.91
CFI-Robust	0.890
SRMR	0.064
RMSEA-ML	0.093
RMSEA-Robust	0.090

E19.

CFA Pattern Matrix - Five Factor (CFA) Measurement Model

Factors	Internal Org Factors F1	External Org Factors F2	Extent of B2B Adoption F3	Performance Improvement F4	Efficiency Improvement F5	R-Square (Communalities)
1	0.601	0	0	0	0	0.533
2	0.692	0	0	0	0	0.515
3	0	0.803	0	0	0	0.320
4	0	0.821	0	0	0	0.299
5	0	0	0.702	0	0	0.685
6	0	0	0.681	0	0	0.785
7	0	0	0	0.751	0	0.511
8	0	0	0	0.652	0	0.664
9	0	0	0	0.650	0	0.425
10	0	0	0	0.822	0	0.567
11	0	0	0	0	0.821	0.784
12	0	0	0	0	0.652	0.440
13	0	0	0	0	0.891	0.513
Eigenvalues	1.27	1.63	1.38	2.65	2.47	-----

E20.

Factor Correlations – Five Factor (CFA) Measurement Model

Factor	F1	F2	F3	F4	F5
F1	1.00	0.604	0.600	0.490	0.660
F2	0.604	1.00	0.656	0.556	0.676
F3	0.600	0.656	1.00	0.380	0.770
F4	0.490	0.556	0.380	1.00	0.720
F5	0.660	0.676	0.770	0.720	1.00

E21.

Fit Indices and Statistics for Structural Equation Model (SEM)

Statistic	Structural Model
Chi – Square	180.50
DF	344
Mardia’s Normalised Estimate	9.20
Free Parameters	33
Fixed Parameters	18
CFI-ML	0.920
CFI-Robust	0.920
SRMR	0.069
RMSEA-ML	0.087
RMSEA-Robust	0.084

Appendix F: Ethics Clearance Approval



TOOWOOMBA QUEENSLAND 4350
AUSTRALIA
TELEPHONE +61 7 4631 2300 www.usq.edu.au

OFFICE OF RESEARCH AND HIGHER DEGREES
Ashley Steele Research Ethics Officer
PHONE (07) 4631 2690 | FAX (07) 4631 2955 EMAIL steele@usq.edu.au

Monday, 23 February 2009

Anas A. Al-Bakri 18/195 Hawkesbury Rd, Westmead NSW 2145

Re: Ethical Clearance –

The Adoption and Diffusion of Business-To-Business Systems by Small and Medium Enterprises (SMEs) in Amman and the Perceptions of its Influence on Performance and Efficiency

Dear Anas,

The USQ Human Research Ethics Committee recently reviewed your application for ethical clearance. Your project has been endorsed and full ethics approval was granted 23/02/2009. Your approval reference number is: **H09REA024** and is valid until **23/02/2010**. The Committee is required to monitor research projects that have received ethics clearance to ensure their conduct is not jeopardizing the rights and interests of those who agreed to participate. Accordingly, you are asked to forward a **written report** to this office after twelve months from the date of this approval or upon completion of the project. A questionnaire will be sent to you requesting details that will include: the status of the project; a statement from you as principal investigator, that the project is in compliance with any special conditions stated as a condition of ethical approval; and confirming the security of the data collected and the conditions governing access to the data. The questionnaire, available on the web, can be forwarded with your written report.

Please note that you are responsible for notifying the Committee immediately of any matter that might affect the continued ethical acceptability of the proposed procedure.

Yours sincerely



Ashley Steele

Research Ethics Officer

Office of Research and Higher Degrees