Antecedents of business-to-business e-commerce adoption and its effect on competitive advantage in manufacturing small and medium-sized enterprises:

A comparative study of United States of America and Egypt

by

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Abstract

Business-to-business (B2B) e-commerce adoption has become a necessity for most small and medium-sized enterprises (SMEs), allowing them to gain and sustain competitive advantage in a dynamic competitive environment. Accepting the fact that B2B is adopted at different levels based on different resources leads to the acceptance that competitive advantage is gained and sustained on a level consistent with the level of adoption. This study employs quantitative method based on the positivism philosophy and deductive approach. A questionnaire survey technique was used to collect the data from the American and Egyptian manufacturing SMEs. Moreover, it used structural equation modelling with a sample of 320 and 260 manufacturing SMEs in the United States of America and Egypt respectively.

The structural equation modelling (SEM) findings revealed that each level of B2B e-commerce adoption was affected by different factors from another level of adoption. Besides, there was a significant difference between the issues which faced manufacturing SMEs in USA and Egypt. Furthermore, in Egyptian manufacturing SMEs, relative advantage and competitive pressure have a significant effect on adoption behaviour. On the other hand, when American manufacturing SMEs made their decisions to adopt B2B e-commerce, they considered the main factors to be relative advantage, top management support, firm size and government support. In addition, the findings revealed that the higher the level of B2B e-commerce, which an SME adopted, the higher the level of competitive advantage it gained. However, in developing countries such as Egypt, SMEs remained far behind their peers in developed countries.

In terms of theoretical implications, the study could be considered to be a unique study in the field of B2B e-commerce generally and B2B e-commerce in Egyptian manufacturing SMEs in particular. This is because, by looking back at the literature review, is clear that empirical studies into B2B e-commerce issues, including manufacturing SMEs, remained embryonic in developed countries and rare in the developing countries. This is especially so in the Arabic countries. In addition, most

previous studies focused on a broad and generic view of the SMEs' adoption of B2B e-commerce or on the relationship between adoption of IT and competitive advantage. This study was conducted in a cross-country context; it considered the manufacturing SMEs' adoption of B2B e-commerce from the perspective of the level of adoption. Therefore, it made an original empirical contribution towards the current body of knowledge on the adoption of B2B e-commerce through the identification of manufacturing SMEs adoption levels of B2B e-commerce; their impacts on competitive advantage; and the significant factors which influenced each adoption level of B2B e-commerce in USA and Egypt. In addition, this study used TOE as the theoretical framework in investigating the factors affecting B2B e-commerce in SMEs and focused largely on the factors affecting each level; this is a new contribution to the extant literature.

Turning to the study's practical implications, important implications for the manufacturing SMEs' owner/managers can be drawn from the findings to help them to understand their environments as, in a cross-country business context, they move through the different stages of adopting B2B e-commerce. In addition to the implication for manufacturing SMEs' owners/managers, this study presents important implications for governmental, nongovernmental organisations and other institutions linked to manufacturing SMEs. Similar to other studies, this study has a number of limitations. The main one is that it lacks the use of qualitative analysis to depict how SMEs understand the concept of competitive advantages and how this helps them to survive and grow.

Key words: TOE framework, B2B e-commerce adoption, competitive advantage, SMEs

and Egypt and USA

DEDICATION

To my great father and mother,

To my brothers and sisters, and friends

A special dedication to my director of studies,

Ibrahim Elbeltagi

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List of Abbreviations

Abbreviation	Full term
B2B e-commerce	Business-to-business electronic commerce
SMEs	Small and medium-sized enterprises
SEM	Structural equation modelling
USA	United States of America
TOE framework	Technology-organisation-environment framework
WTO	World Trade Organisation
IDC	International Data Corporation
OECD	Organisation for Economic Co-operation and Development
GDP	Gross domestic product
UNDP	United Nations Development Programme
SBA	Small Business Administration
BIS	Department for Business, Innovation & Skills
MEP	Manufacturing Extension Partnership
NCC	National Computing Centre
CAD	Computer-aided design
CAM	Computer-aided manufacturing
VPDM	Virtual Product Development Management
PDM	Product data management
SKU	Stock Keeping Unit
TAM	Technology acceptance model
IDT	Innovation diffusion theory
PLS	Partial Least Squares
CB-SEM	Covariance Based-Structural Equation Modelling

PLS-SEM	Variance Based-Structural Equation Modelling
VIFs	Variance Inflation Factors
ARS	Average R-squared
APC	Average Path Coefficient

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Author's Declaration

I declare that this thesis has not been previously submitted, either in this university, or any other university, for a degree or any other qualification. In addition, I declare that all of the work done in this thesis is my own work. This study was fully financed by the Iraqi Government.

The following activities were undertaken in connection with the programme of study:

- Attendance in a number of courses in data analysis, in particular, courses on 'Quantitative Analysis: Bivariate and Multivariate Analysis.
- Attending in learning and teaching for general teaching associates (GTA) course.

Publications arising from the thesis:

A- Papers under review:

- Levels of B2B e-commerce adoption and competitive advantage in SMEs: A comparison study between Egypt and USA.
- Factors affecting levels of B2Be-commerce adoption in Small and Medium Size manufacturing enterprises: A cross-country comparison between USA and Egypt

B- Papers in Progress:

- Antecedents of business-to-business e-commerce adoption and its effect on competitive advantage in manufacturing small and medium-sized enterprises: An empirical investigation of USA manufacturing SMEs.
- B2B e-commerce and manufacturing SMEs in developing countries: factors affecting and benefits of adoption

- The factors that affect Business-to-Business e-commerce adoption and its impact on competitive advantage in manufacturing small and medium-sized enterprises: An empirical investigation of Egypt manufacturing SMEs.
- Achieving benefits from business-to-business electronic commerce: empirical study in USA SMEs.

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Chapter 1: Introduction

1.1 Research background

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1.2 Research problem

1.3 Research aim and objectives

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1.1 Research background

This study is concerned with levels of B2B e-commerce adoption and competitive advantage in the manufacturing SMEs in the United States of America (USA) as a developed country and in Egypt as a developing country, and the factors which influence the adoption of B2B e-commerce. These indicate that this study incorporates number of areas of research: manufacturing SMEs in the USA and Egypt; and B2B e-commerce as a technology to support manufacturing SMEs facing the threat of large manufacturers. This part of the study, looking at the background to the study, explains the rationale behind choosing manufacturing SMEs, USA (in a developed country) and Egypt (in a developing country), and B2B e-commerce as the study topics.

1.1.1 Why B2B e-commerce?

Developments of communication technology and the increased application of internet technologies have changed the worldwide economy and contributed to the growth of electronic commerce (e-commerce). E-commerce represents a highly pervasive innovation (Lefebvre et al., 2005). It emerged only in recent years, and has brought significant changes in business practice.

In addition, e-commerce can be classified essentially into business-to-business (B2B); business-to-consumer (B2C); business-to-government (B2G); business-to-peer (B2P); consumer-to-business(C2B); consumer-to-consumer (C2C); consumer-to- government (C2G); consumer-to-peer(C2P); government-to-business (G2B); government-to-

consumer (G2C); government-to-government (G2G); government-to-peer (G2P); peer-to-business (P2B); peer-to-consumer (P2C); peer-to-government (P2G); and peer-to-peer (P2P) (Tassabehji, 2003).

Business-to-business (B2B) is e-commerce among businesses, for instance, among a manufacturer and a supplier or wholesaler, or among a retailer and a wholesaler. This is the exchange of services, products or information between businesses rather than between consumers and businesses (WTO, 2013). B2B e-commerce is one of the fastest-growing segments of the application of e-commerce (Zhou, 2004, Lefebvre et al., 2005, Tsao et al., 2004). Moreover, the World Trade Organisation (WTO) (2013) reported that B2B transactions comprised 90% of all e-commerce and e-commerce gained a high share of its profits from B2B e-commerce. According to the International Data Corporation (IDC) study, global B2B e-commerce amounted to US$ 12.4 trillion at the end of 2012 (WTO, 2013).

Generally, e-commerce researchers considered that the value of B2B e-commerce transaction is expected to vastly exceed B2C e-commerce. Similarly, experts mentioned generally that the value of B2B e-commerce transactions was about 10 times the value of B2C e-commerce (Steinfield, 2004).

B2B e-commerce has grown and boomed rapidly worldwide (Dai and Kauffman, 2000, Lee et al., 2003). In addition, B2B e-commerce is becoming an important factor for more companies (Thatcher et al., 2006) because it changes the business environment, global competition and the relationship between trading partners.

Furthermore, B2B e-commerce provides many opportunities for growth and benefits for firms such as cost reduction (e.g. transaction cost, coordination cost, distribution cost, communication cost, publication cost, customer support costs, advertising and marketing costs, administration costs, order handling and management costs, inventory cost and supply chain costs); improving efficiency; a better supplier relationship; access to global markets; new customers and suppliers not previously accessible; improved productivity; responding faster to demands, finance and marketing being made possible anywhere; 24 hour access to real time business views formed by current information from integration; potentially, reduced staff overheads; improved ability to compare options; find suppliers more cheaply and quickly; shorter delivery times; enabling faster decisions; providing better, cheaper, faster and accurate information; offering more products and services; increased profits and gained competitive advantage (Humphreys et al., 2006, Elia et al., 2007, Lin et al., 2007, Standing and Lin, 2007, N`Da et al., 2008, Bigne-Alcaniz et al., 2009, Xin, 2009, Al-Bakri et al., 2010, Fauska et al., 2013). Based on the above mentioned factors, this study focuses on examining B2B e-commerce rather than other type of e-commerce.

1.1.2 Why Small and medium-sized enterprises (SMEs)?

The researcher decided to choose small and medium sized enterprises (SMEs) as an area of study since they play an important, vital and integral role in every country's economy (Storey, 1994, Tagliavini et al., 2001, Daniel et al., 2002b, Street and Meister, 2004, Lawson-Body and O`Keefe, 2006, Harrigan et al., 2009). They have become an essential sector of all countries' economies. SMEs constitute more than 90% of businesses and are expected to account for 80% of global economic growth

(OECD, 2012). Additionally, in many economies; SMEs represent the segment with the largest increase (Harrigan et al., 2009).

Moreover, Bouri et al. (2011) mentioned that, in developed and developing countries, the SME sector is considered to be the `backbone` of their economies. Organisation for Economic Co-operation and Development (OECD) (2012) reported that, in the developed counties, more than 95% of enterprises were SMEs. These firms accounted for almost 60% of private sector employment. For example, in the USA, SMEs are an important part of the economy representing 27.8 million businesses or 99% of all companies. They create about 65% of net new private sector jobs; and employ over half of the private sector's employees (SBA, 2012).

Similarly, Ayyagari et al. (2011) stated, in developing countries, the SME sector makes a critical contribution to employment and gross domestic product (GDP), and they are, also, an essential part of the economy. For example, Egyptian SMEs are major job providers; they create an important share of total added value and provide a great proportion of the middle-income and poor people with affordable goods and services. Additionally, 99% of Egyptian enterprises are small (employing between 1 and 49 workers)(Ghanem, 2013).

In addition, B2B e-commerce has become a requirement for servicing the business needs of SMEs effectively (Kartiwi and MacGregor, 2007, Al-Bakri et al., 2010), and it can help SMEs to gain a variety of benefits such as enhancing the SMEs' abilities to compete with large organisations in the global markets (Jaidee and Beaumont, 2003),

and to expand the SMEs' market-share (Mullane et al., 2001, Abou-Shouk, 2012). SMEs are described as slow adopters of technology generally and e-commerce in particular (Alam et al., 2011, Beekhuyzen et al., 2005).

For developed countries, on the one hand, the B2B e-commerce adoption was generally a success and a valid option for growing the e-commerce market (Al-Hudhaif and Alkubeyyer, 2011). Similarly, Dean et al. (2012) reported that the USA leads the world in B2B e-commerce, and American SMEs have integrated the Internet into their businesses. On the other hand, in developing countries, SMEs were not active initiators of B2B e-commerce (Mensah et al., 2005). Recent studies found that SMEs in Egypt had adopted only basic applications of e-commerce (Abou-Shouk et al., 2012, Zaied, 2012).

1.2 Research problem

From a theoretical perspective, the literature review demonstrates that most previous studies (i.e.,Wang and Lin, 2009, Al-Bakri et al., 2010) focused on a broad and generic view of the SMEs' adoption of B2B e-commerce, or on the relationship between the adoption of IT and competitive advantage (i.e.,Porter, 2005, Bhatt et al., 2010). Some extant studies identified different levels of B2B e-commerce implementation and adoption by manufacturing SMEs (i.e.,Lefebvre et al., 2005, Elia, 2009). However, they lacked the focus of factors that influence each level of B2B e-commerce adoption and they failed, also, to identify the competitive advantages gained by adopting each level. This study aims to fill this gap in the literature.

Additionally, the empirical studies in this important sector (SMEs) are still in an embryonic stage in the context of B2B e-commerce research especially in manufacturing SMEs (Lefebvre et al., 2005, Elia et al., 2007). However, compared to other sectors, manufacturers made more widespread use of B2B e-commerce. For example, American manufacturers' B2B e-commerce activities were the highest amongst all sectors (accounting for 42% of total shipments or $1,862 billion) (Sila, 2013).

Therefore, this study investigates the adoption levels of B2B e-commerce and how these affect the SMEs' competitive advantage, and identify the significant factors that influence each level of B2B e-commerce adoption in manufacturing SMEs in USA as a pioneer developed country leads the world in B2B e-commerce adoption, and in Egypt as a large developing country whose economy depended heavily on SMEs.

1.3 Research aim and objectives

This study aims to investigate the adoption levels of B2B e-commerce amongst manufacturing SMEs in USA and Egypt. The investigation would provide a comprehensive understanding of how each level of B2B e-commerce achieve a different degree of competitive advantage, and how different factors affect each level of adoption. The study objectives are as follows:

- To identify the factors affecting the B2B e-commerce adoption/ each level of adoption in manufacturing SMEs in a cross-country context, and to compare a developed (USA) with a developing country (Egypt).

- To identify the actual adoption level of B2B e-commerce amongst manufacturing SMEs in both USA and Egypt and to compare a developed country (USA) with a developing country (Egypt).

- To determine the effects of different levels of B2B e-commerce adoption on competitive advantage of manufacturing SMEs in Egypt and USA, and to compare a developed country (USA) with a developing country (Egypt).

- To examine the indirect impacts of technological, organisational and environmental factors on the competitive advantage of manufacturing SMEs in both USA and Egypt, and to compare the results of the American manufacturing SMEs with the Egyptian manufacturing SMEs' results.

- To suggest recommendations for owners/managers of manufacturing SMEs and policy makers to enhance the future success of manufacturing SMEs in both the USA and Egypt.

1.4 Research methodology

This study uses quantitative method based on the positivism philosophy and deductive approach. The researcher selects a questionnaire survey technique to collect the data from the American and Egyptian manufacturing SMEs. In addition, the questionnaire survey is most commonly used by researchers aiming to answer questions like what, who, where, how many and how much. Therefore, it tends to be

used for a descriptive and exploratory study. It is popular, also, because it allows a huge quantity of data to be collected from a study's population in an economical way (Saunders et al., 2009). It is selected frequently when there is a need to study a large sample with a reasonable investment of effort, time and cost (Podsakoff and Dalton, 1987).

1.5 Structure of the thesis

In order to achieve the study's aims and objectives, the researcher divided this thesis into seven chapters.

Chapter 1 explains the background to the study and its aims and objectives. Also, it explains briefly the study's methodology and the structure of the thesis.

Chapter 2 covers the definition of SMEs, the economic contribution of the USA's SMEs, and the economic contribution of the Egyptian SMEs. In addition, it considers the definition of B2B e-commerce; the SMEs' adoption of B2B e-commerce; and considers the factors affecting the adoption of B2B e-commerce. Besides, chapter 2 describes the models relating to the stages in adopting B2B e-commerce. Moreover, this chapter considers, also, the definition of competitive advantage, and the relationship between adoption of technology and competitive advantage.

Chapter 3 reviews some technology adoption theories like the technology acceptance model (TAM), the innovation diffusion theory (IDT) and the technology-organisation-

environment frameworks (TOE). Additionally; it describes the study's conceptual framework and hypotheses.

Chapter 4 discusses the study's research philosophy; the research approach; and the research methods. It explains the ideas behind the quantitative method. Also, it introduces, in detail, how the quantitative data collection tool is designed and measured. In addition, this chapter deals with the issues regarding the study's sampling frame and sample size. Besides, this chapter describes the procedures used to pilot and validate the questionnaire of the study. Moreover, it explains the data collection and response rates.

Chapter 5 discusses the study's findings, and comprises of an explanation of the descriptive statistics of the data, the non-response bias, the reflective measurement model, the formative measurement model, and the structural model.

Chapter 6 presents the discussion of findings; it discusses the levels of B2B e-commerce adoption by manufacturing SMEs; their impacts on competitive advantage; and the significant factors which influence each adoption level of B2B e-commerce. Moreover, the study discusses the indirect impact of technological, organisational and environmental factors on competitive advantage.

Chapter 7 discusses the study's conclusion and the theoretical and managerial implications. Also, it presents recommendations to governmental bodies and

manufacturing SMEs. In addition, this chapter mentions the study's limitations and areas for future research.

1.6 Summary

In summary, chapter one provided the background to the research, and presented the study's aim and objectives. In addition, this chapter explained briefly the study methodology. Finally, it presented the structure of the thesis.

Chapter 2: B2B e-commerce and competitive advantage in small and medium-sized enterprises (SMEs)

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2.1 Introduction

SMEs play an important role in every country's economy. Furthermore, B2B e-commerce has become a requirement for servicing the business needs of SMEs effectively, and it can help SMEs to gain a variety of benefits such as enhancing the competetive advantge. This chapter looks at the definition of SMEs; the SMEs' economic contribution in the USA and Egypt; the definition of B2B e-commerce; the SMEs' adoption of B2B e-commerce. In addition, it describes the models relating to the stages of B2B e-commerce adoption. Moreover, this chapter considers, also, the concept of competitive advantage and the relationship between adoption of technology and competitive advantage.

2.2 Profile of SMEs in USA

2.2.1 Definition of SMEs

There is no agreement about the definition of SMEs; therefore, there are many definitions which vary according to the study, country, and sector to which they are applied. In addition, the number of employees, turnover, revenues, and balance sheet (other factors) are used to categorize businesses into micro, small and medium sized. Also, even between studies, these factors such as the numbers of SMEs employees vary either from country to country or from sector to sector.

In this study, the definition of SMEs is based on the number of employees. In the USA, an SME is defined as a business which is established for profit; has a business location in the USA; works primarily within the USA. Also, an SME adds an important

contribution to the American economy through the payment of taxes and the use of American goods, employees or resources; and is run and owned independently. The business may be either an individual proprietorship, corporation, partnership, or any other lawful form. 1 -100 employees is small and 101-499 employees is medium (SBA, 2012).

2.2.2 Number of SMEs in the USA

In the USA, there are a total of 27.8 million SMEs (SBA, 2012). Most of the small companies are non-employers that equalled 22,110,628. A non-employer business refers to a firm which has no paid workers. Most of the owners of these very small businesses are self-employed. There are 5,717,302 firms with less than 500 employees. According to the number of small and medium sized manufacturers in the USA, there are approximately 573,600 SMEs in the manufacturing sector (SBA, 2012). These manufactures included 98% of all USA manufacturing firms and employed about 5.3 million employees, or about 41% of all American manufacturing jobs (Ezell and Atkinson, 2011).

2.2.3 Economic contribution of the USA SMEs

The SME sector is the `backbone` of the economy in developed countries (Bouri et al., 2011). In most economies, SMEs represent the segment with the most increases (Tagliavini et al., 2001, Lawson-Body and O`Keefe, 2006, Harrigan et al., 2009).The OECD (2012) reported that, in the developed counties, more than 95% of enterprises were SMEs. These firms accounted for almost 60% of private sector employment.

In Australia, the SMEs account for more than half of all businesses and over half of all employment (Kazi, 2007, Alam and Noor, 2009). Furthermore, SMEs form the backbone of the European economy. Ecorys (2012) reported that in the European countries, 99.8% of enterprises were SMEs. For instance in the UK, SMEs represent a important part of the economy and, in the last decade, they have grown in number and their importance has increased significantly. Hence, the UK government expends considerable resource in providing support services for this sector (McQuaid, 2003, Simpson and Docherty, 2004, Barnes et al., 2008). Besides, the SMEs together accounted for 99.9% of all enterprises in UK (BIS, 2010).

Regarding the USA, SMEs are an important part of the economy with 27.5 million businesses which represent 99.7% of all employer firms. They create about 65% of net new private sector jobs; employ over half of the private sector's employees (OECD, 2012, SBA, 2012); and pay 43% of entire private sector payroll. Also, they generate more than half of the private GDP; hire 43 % of high tech employees (engineers, scientists, computer programmers, and others); make up 97.5 % of all identified exporters; and, in the 2008 financial year, created 31% of the value of exports value. In addition, the SMEs create 16.5 times more patents per worker than large patenting businesses (SBA, 2012).

Concerning the USA manufacturing sector, it plays a vital role in the American economy; it provides massive benefits and creates essential contributions to the country's economy. These are as follows:

- The USA's manufacturing sector is the world's leading producer, making a high percentage of what the country consumes.

- The USA's manufacturing firms make more nowadays than at any other time, and the American manufacturing sector represents the eighth largest worldwide economy.

- The USA's manufacturers have been the best producers of manufactured products for more than a century; presently, they create roughly 18% of global manufactured products (Creticos and Sohnen, 2013).

- The manufacturing sector is one of the key tools of wealth creation in the USA. It generates $1.4 trillion in annual output; accounts for 12 % of Gross Domestic Product (GDP); two-thirds of exports of services and products; and uses more than 14 million employees. From 2002 to 2004, manufacturing firms contributed 15 % of America's economic growth, more than any other segment.

- The American manufacturing sector has a vital role in supporting innovation and technology, accounting for approximately two-thirds of the USA's expenditure on Research and Development (R&D). It is clear that new processes and products, developed in the manufacturing sector, contribute vitally to the USA's economic leadership, competitiveness and the present high standard of living (MEP, 2011).

- America's manufacturing sector is the backbone of the economy which pulls the coach of American productivity. Between 1994 and 2004, productivity, in the manufacturing sector, grew annually by 4.5%, whereas, in other sectors, productivity grew at an annual rate of only 2.7%. Growth productivity leads to larger incomes on invested money and enables firms to increase employees' wages. Over the past 2 decades, the productivity and innovation growth stemming from this sector has

supported the USA's success in global markets; assisted energy productivity in the service sector; provided high-quality occupations; and raised the country's standard of living (Murphy, 2006).

Manufacturing firms are a source of highly paid jobs for employees at all education and skill levels (Creticos and Sohnen, 2013), and manufacturing firms drive the growth in jobs. In addition, compared to other private sectors, this sector employs more scientists, highly skilled workers and engineers (MEP, 2011).

- America's manufacturing firms are responsible for two-thirds of all exports of services and goods. That's roughly exports of $50 billion a month (Murphy, 2006).

In addition, the American government understands that the manufacturing sector is a necessary part of the country's growing and strong economy. The government realises, also, that, to support a growing and strong manufacturing sector, it needs strong small and medium-sized manufacturers which form the backbone of the manufacturing sector (Sperling and Mills, 2012).

The manufacturing SMEs form the backbone of the manufacturing sector which is the main part of the American economy; they comprise 98% of all of the country's manufacturing firms. Besides, they employ more than 8 million workers. This represents nearly 60% of the American manufacturing labour force (Sperling and Mills, 2012, MEP, 2011). In addition, American small and medium-sized manufacturers play a vital role in exports activity. 96% of export firms have less than 500 employees (Murphy, 2006, Olive, 2008, Trembley, 2008).

Moreover, American small and medium manufacturers have significant competitive strengths. They are flexible; close to the customer; innovative; responsive; and entrepreneurial. Besides, they provide attractive job opportunities for ambitious, bright workers who, in turn, support their competitive strengths. These small and medium-sized manufacture characteristics are critical elements of the free enterprise economy which has made the USA the most successful industrial country in the world.

In addition, small and medium-sized manufactures play an important role in answering these competitive challenges and are a significant part of the solution. There are some future trends for small and medium-sized American manufactures. For instance, large manufacturers increase their reliance on suppliers of parts because they streamline their processes. This affects positively the growth of many small and medium-sized manufacturers since they expand their businesses into areas operated and owned previously by large manufacturers (Murphy, 2006).

2.3 Profile of SMEs in Egypt

2.3.1 Definition of SMEs

For Egypt, according to law no. 141/2004, a small business is any firm or individual company running an economic activity. This comprises of service, productive or trade activities and whose workforce do not exceed 50 employees. Medium sized businesses are those with 50–100 employees (Alasrag, 2007, Abou-Shouk, 2012).

2.3.2 Number of SMEs in Egypt

There are 1,641,791 small and medium sized enterprises in the services, trade, construction, and manufacturing sectors; this comprises 99.7 % of the entire number of companies in Egypt. According to number of small and medium sized manufacturers in Egypt, 10% of SMEs operate in manufacturing sector. This includes wood and furniture; food processing; building materials; ceramics; building materials; and some engineering and electrical workshops. This means that there are, in total, 164,179 small and medium sized is manufacturers in Egypt; these manufactures include 99.7% of all Egypt manufacturing firms (Ministry of Finance, 2005, Ghanem, 2013).

2.3.3 Economic contribution of Egyptian SMEs

in developing countries, the SME sector makes a critical contribution to employment and GDP, and they are an essential part of their economies (Ayyagari et al., 2011). However, in comparison with developed countries` s SMEs sectors, this sector is still less developed (Bouri et al., 2011). For example, SMEs represent more than 95% of all the firms in Lebanon. In the UAE, SMEs comprise roughly 94.3% of the country's companies, and employ approximately 62% of the workers (Elasrag, 2011).

In Egypt, 99% of Egyptian enterprises are SMEs (Elasrag, 2011, Ghanem, 2013). Additionally, SMEs sector are the major job providers; they provide jobs for almost three-quarters of new applicants to the labour market (Ghanem, 2013). They provide a great number of poor people and middle-income people with affordable goods and

services (UNDP, 2005). In addition, although the SMEs represent the majority of the Egyptian companies, their added value is quite low (El Kabbani and Kalhoefer, 2011).

In Egypt, the majority of SMEs are very small; have an average assets value of US$5,000 and, on average, employ 2.2 workers. Moreover, Egyptian SMEs are typically family businesses providing simple services to the household sector. Data from the 2003 survey (survey carried out by the Economic Research Forum (ERF) in 2003 covering 4,957 enterprises) indicated that 63.5% of SMEs workers were relatives or friends of the manager/owner; this supports the viewpoint of this sector being dominated by family businesses. With regard to their main clients, 90% of SMEs sell their products or service to households and 7% sell to other companies and public sector. This suggests that 97% of SMEs sell to local markets and only 0.3 % of SMEs sell to the export market.

Moreover, Egyptian SMEs tend to use simple technologies and have very low capital-labour ratios. According to the 2003 and the 2011 surveys (survey carried out by the Economic Research Forum (ERF) in 2011 covering 3,000 enterprises), the average capital-labour ratio, calculated from the 2003 survey, is around US$1,600 (about LE 10,000) and, from the 2011 survey, US$2300 (about LE 14,000). Besides, these surveys asked SMEs' owners/managers of about the type of technology they use; this comprised of a selection between traditional, modern and up to date. Amongst the manufacturing firms, 68% indicated that they use traditional technology, whereas 30 % use modern technology and only 2% use up-to-date technology (El-Mahdi, 2012, Ghanem, 2013).

For Egyptian manufacturing sector, since the 1920's, the Egyptian manufacturing sector has been known to be a main source of growth. The manufacturing sector includes both private and public manufacturers. Regarding small and medium sized manufactories in Egypt, manufacturing SMEs represent 99.7% of all Egyptian manufacturing firms (Ministry of Finance, 2005). These comprise of wood and furniture; food processing; building materials; ceramics; building materials; and some engineering and electrical workshops (Ghanem, 2013). The manufacturing SMEs represent the part of Egyptian SMEs, their activities have grown in recent years (El Kabbani and Kalhoefer, 2011). According to 2011 survey of 3,000 Egyptian manufacturing and services enterprises, manufacturing companies are more likely to innovate in their businesses (Ghanem, 2013).

2.4 Definition of B2B e-commerce

B2B e-commerce has a wide range of definitions. According to Turban et al. (2004), McGaughey (2002) and Gunasekaran et al. (2002), they gave definitions of B2B e-commerce from various perspectives. For instance, Turban et al. (2004) defined B2B e-commerce through different perspectives. Firstly, a communication perspective refers to delivering products, services, information, or payment either over computer networks or by any other electronic tools; these processes are called B2B e-commerce. Secondly, it is activities which streamline by using electronic networks, an enterprise's processes such as selling, buying, exchanging, or transferring goods, services and information. Thirdly, it supplies the capability for firms to buy and sell goods, services and information via the Internet or other electronic means. Fourthly,

service perspective defines B2B e-commerce as tools which cut the costs of improving the quality of partner services.

In addition, from an application viewpoint, Gunasekaran et al. (2002) defined B2B e-commerce as a form of IT which helped, in an electronic way, enterprise transactions between different entities so as to achieve enterprise or individual objectives. Besides, from most final consumers' viewpoints, McGaughey (2002) defined B2B e-commerce as an activity which occurred behind the scenes.

McGaughey (2002), Gunasekaran et al. (2002) and Turban et al. (2004), gave definitions of B2B e-commerce from various perspectives. For example, Turban et al. (2004) defined B2Be-commerce by means of four perspectives: communication perspective; activities perspective; commercial perspective; and service perspective. They defined B2B e-commerce more accurately than McGaughey (2002) and Gunasekaran et al. (2002).

Furthermore, some researchers, such as (Haig, 2001, Kamel and Hussein, 2001, Geunes et al., 2002, Wichmann, 2002, Ross, 2003, Kajan, 2003, Chaffey, 2004, Teo and Ranganathan, 2004, Baghdadi, 2004, Zhou, 2004, Aggestam and Soderstrom, 2005, Fong and Hui, 2006, Grigoryan, 2006, Esichaikul, 2007, Behkamal et al., 2009, Fauska et al., 2013) defined B2Be-commerce as business activities which included purchasing and selling goods and services between organisation via the Internet or other electronic tools, as can be seen from Table 2-1.

Table 2-2: The definitions of B2B e-commerce (group A)

Author(s)	Definition
(Hara et al, 2001)	B2B e-commerce refers to the activity which uses Internet websites for conducting business-to-business transactions.
(Clarke, 2001)	B2B e-commerce of interactions between business enterprises; however, often the process of buying and selling goods and services is more emphasized.
(Haig, 2001)	B2B e-commerce is a term used to refer to a transaction conducted online, and the business network and supply chains which facilitate this transaction.
(Kamel and Hussein, 2001)	B2B e-commerce is defined as buying and selling products, services and information through computer networks.
(Chakrabarti and Kardile, 2002)	B2B e-commerce is defined generally as the processes that include buying and selling products and services among companies by Internet.
(Geunes et al., 2002)	B2B e-commerce is referred to as that commerce which can be conducted in business over an intranet, extranet or Internet.
(Wichmann, 2002)	Purchasing, marketing and sales, which are sustained by the Internet, an intranet or an extranet, are referred to as B2B e-commerce.
(Bidgoli, 2002)	B2B e-commerce is referred to as the activities which include electronic transactions between businesses.
(Ross, 2003)	B2B e-commerce is referred to as using an Internet application to enable companies to sell goods and services to other businesses online.
(Kajan, 2003)	B2B e-commerce is defined as electronic commerce between two or more business partners via the third wave of EC.
(Chaffey, 2004)	B2B may be defined as online commercial transactions between organisations.
(Teo and Ranganathan, 2004)	B2B e-commerce refers to making use of the Internet and web- technologies to conduct inter-organisational business transactions.
(Baghdadi, 2004)	B2B e-commerce refers to the process in which a business sells goods and services to other businesses.
(Juul et al., 2004)	B2B e-commerce indicates the process of applying digital exchanges of documents, digital goods or services with other firms.
(Tsao et al., 2004)	B2B e-commerce refers to the commercial

	activities conducted, through the internet, between different companies or parts of companies.
(Zhou, 2004)	Any business process between two companies, which use web-based network technology to conduct their businesses, is called B2B e-commerce.
(Aggestam and Soderstrom, 2005)	B2B e-commerce is using the Internet and web technologies to achieve inter-organisational business transactions.
(Grigoryan, 2006)	B2B e-commerce is a commercial activity which takes place between two or more business organisations.
(Fong and Hui, 2006)	B2B e-commerce refers to the activities which different firms conduct via a network involving primary producers, sub- suppliers, distributors and retailers.
(Grigoryan, 2006)	B2B e-commerce refers to those business activities over the Internet, related to purchasing and selling goods and services, among organisations
(Esichaikul, 2007)	B2B e-commerce refers to all kinds of computer-enabled inter- company trade.
(Standing and Lin, 2007)	B2B e-commerce is the use of electronic commerce systems or practices between organisations.
(Jessup and Valacich, 2008)	B2B e-commerce refers to the commercial activity conducted between business partners such as suppliers and intermediaries.
(Lin and Huang, 2007)	B2B e-commerce may be defined as all the Internet-based commercial activities which are dealt with and conducted between two or more different organisations.
(Fauska et al., 2013)	B2B e-commerce refers to companies selling services and goods to other companies by using Internet and related technologies.

These groups of researchers focused on the three main points. First, B2B e-commerce involves buyers and sellers, both are business organisations. Second, B2B e-commerce is these activities which include buying, selling and exchanging of goods, services and information. Third, these business activities are fulfilled over the Internet and related technologies. Although this group focused on three main points

which related strongly to B2B e-commerce, they failed to focus on the benefits of B2B e-commerce. While, Subramani and Walden (2000), Barnes-Vieyra and Claycomb (2001), McGaughey (2002), Moodley (2003), Turban et al. (2004), Claycomb et al. (2005) and Al-Bakri et al. (2010) defined B2B e-commerce not only as activities including purchasing and selling goods and services online but, also, they focused on the benefits of B2Be-commerce. As shown in Table 2-2.

Table 2-2: The definitions of B2B e–commerce (group B)

Author(s)	Definition
(Subramani and Walden, 2000, p. 239)	B2B e-commerce is defined as a relationship amongst companies. This relationship includes the adoption of similar standards; extensive inter – company communication; collaboration and bringing together information technology (IT) investment.
(Barnes-Vieyra and Claycomb, 2001, p. 15)	B2B e-commerce is referred to as using the internet to exchange valuable information between firms and their business partners regardless of geographical and time restrictions.
(Barnes-Vieyra and Claycomb, 2001, p. 15)	B2B e-commerce may be referred to as the secure trading of goods, information and services between businesses using internet technologies.
(McGaughey, 2002, p. 473)	B2B e-commerce is referred to as the network which supports buying, selling and marketing goods and services through businesses. Electronic networks intranets, extranets and the Internet give a good deal of support to communication and transactions between trading partners.
(Moodley, 2003, p. 26)	B2B e-commerce is referred to as a commercial transaction or structured information exchange which, through an ICT-based, computer- mediated network occurs between companies with industry value chains.
(Turban et al., 2004, p. 85)	B2B e-commerce is defined as tools which cut the costs of improving the quality of partner services.
(Thatcher et al., 2006, p. 94)	B2B e-commerce refers to information and communication technologies being deployed to support, throughout the company, the entire value chain from suppliers to customers.

(Claycomb et al., 2005, p. 223)	B2B e-commerce refers to the cross-company integration process which is generated by an innovative supply chain.
(Al-Bakri et al., 2010, p. 215)	B2B e-commerce refers to the process of sharing with local and global business trading partners and suppliers business information; transferring and delivering products and services; maintaining business relationships; and conducting business transactions with the help of telecommunication networks.

Depending on the previous definitions of B2B e-commerce and in considering the study's aims, this study defines B2B e-commerce as business activities which fulfil electronically in order to enhance competitive advantage, related to selling, buying, exchanging, or transferring goods, services and information among organisations.

2.5 Benefits of B2B e-commerce adoption

The adoption of e-commerce is considered to be an attractive alternative for SMEs (Boyer and Olson, 2002) and it has an important effect on all their activities (Lawson-Body and O`Keefe, 2006). Grandon and Pearson (2004) and Wang and Lin (2009) stated that the adoption of e-commerce had a lot of benefits not only for large organisations but, also, for SMEs. Therefore, it is essential for SMEs` managers to realise e-commerce's influence on their organisations (Elia et al., 2007).

Some previous studies, such as (Lefebvre et al., 2005, Bigne-Alcaniz et al., 2009, Al-Bakri et al., 2010, Mustaffa and Beaumont, 2004, Caskey and Subirana, 2007, Sila and Dobni, 2012, Elia et al., 2007) found that B2B e-commerce adoption provided various benefits and had an important effect on SMEs activities.

One of the prime and tangible benefits from implementing B2B e-commerce is cost reduction (Awad, 2002, Straub et al., 2002, Standing and Lin, 2007, Kraemer et al., 2002) such as transaction costs, coordination costs, distribution costs, communication costs, publication costs, administrative costs, management costs, advertising and marketing costs, customer's support costs, supply chain costs and inventory costs (McGaughey, 2002, Standifera and Wall, 2003, Moodley, 2003, Vatanasakdakul et al., 2004, Lefebvre et al., 2005, Humphreys et al., 2006, Standing and Lin, 2007, N`Da et al., 2008, Al-Bakri et al., 2010).

In addition, the use of B2B e-commerce can help to improve the quality of customer service and products (Subramani, 2004, Standing and Lin, 2007, N`Da et al., 2008). Moreover, some studies, such as (Brookes and Wahhaj, 2001, McGaughey, 2002, Standifera and Wall, 2003, Melville et al., 2004, Subramani, 2004, Humphreys et al., 2006, Al-Bakri et al., 2010), found that B2B e-commerce influenced the company`s performance and efficiency through their adopting and using these technologies to help them to facilitate and improve their processes.

Furthermore, B2B e-commerce generates other benefits such as a better supplier relationship (Melville et al., 2004, Subramani, 2004); access to global markets; new customers; and suppliers not previously accessible (McGaughey, 2002, Vatanasakdakul et al., 2004); productivity (Yang and Papazoglou, 2000, Zeng et al., 2003, N`Da et al., 2008); faster response to demands (Standifera and Wall, 2003); better control over operations; marketing and finance being possible anywhere; anytime access to real time business views constructed from integrating current

information; potential reductions in staff overheads (Vatanasakdakul et al., 2004); improved ability to compare options (Haig, 2001, Moodley, 2003); find suppliers more cheaply and quickly (Awad, 2002); shortening delivery time (Moodley, 2003); making faster decisions (Haig, 2001); providing better, cheaper, faster and more accurate information; offering more products and services (Moodley, 2003); competitive advantage (McGaughey, 2002, Pires and Aisbett, 2003, N`Da et al., 2008, Fauska et al., 2013), and increased revenue and profits (N`Da et al., 2008). These benefits are regarded as motivations to encourage companies to adopt B2B e-commerce.

Additionally, Shaw et al. (1997), Lefebvre et al. (2001) and Elia et al. (2007) suggested that the new technologies gave companies a new competitive edge. Adopting B2B e-commerce is referred to as a significant factor in supporting competitive advantage (Ferratt et al., 1996, Loebbecke and Powell, 1998, Wang et al., 2003, Fauska et al., 2013).

These benefits rely on the level of B2B e-commerce adopted by SMEs (Hunter et al., 2004, Lefebvre et al., 2005, Elia et al., 2007, Bigne-Alcaniz et al., 2009); and to what extent they are ready to adopt e-commerce initiatives and willing to exert their efforts to carry out necessary processes (Bui et al., 2002, Huang et al., 2004, Lin et al., 2007).

However, some studies like (Gefen, 2004, Grey et al., 2005), did not suggest that the adoption of B2B e-commerce had many benefits. In the same way, some authors (i. e.,Kleindl, 2000, Drew, 2003) agreed that e-commerce might create, also, drawbacks,

especially for SMEs: B2B e-commerce might increase costs in the short term. The next two sections explain the status of B2B e-commerce in developed and developing countries.

2.6 B2B e-commerce adoption in SMEs in developed countries

B2B e-commerce has evolved to become a strategic initiative for the private sector; a key policy subject for the public sector; and a popular subject for businesses worldwide (Claycomb et al., 2005, Zhu and Thatcher, 2007). Businesses, which hope to be competitive, must be engaged successfully by B2B e-commerce (Standing and Lin, 2007). Companies, which are called losers, do not adapt along with emerging technology and fail to adopt e-commerce (Barnes-Vieyra and Claycomb, 2001). B2B e-commerce has become a significant requirement for all worldwide enterprises: small, medium or large (Kartiwi and MacGregor, 2007, Al-Bakri et al., 2010).

Some previous studies, such as (Love et al., 2001, Drew, 2003, Lefebvre et al., 2005, Elia et al., 2007), showed that most SMEs were still very primitive in using B2B e-commerce. Additionally, Claycomb (2005) and Aggestam and Soderstrom (2005) found that, compared to small ones, large firms had possibly greater adoption levels of B2B e-commerce. However, in their study, Bigne-Alcaniz et al. (2009) found that most SMEs used B2B e-commerce. Similarly, Dean et al. (2012) reported that the USA's SMEs integrated the Internet and related technology extensively into their businesses and that the USA led the world in the use of B2B e-commerce.

In general, the adoption of B2B e-commerce has been successful and a valid option in growing the e-commerce market in developed countries (Al-Hudhaif and Alkubeyyer, 2011). Although some researchers, such as (Kraemer et al., 2002, Humphrey et al., 2003), predicted that B2B e-commerce could be a new driver of economic development for developing countries, firms, in these countries, have not been active initiators of B2B e-commerce (Mensah et al., 2005). The following section describes the state of B2B e-commerce in developing countries.

2.7 B2B e-commerce adoption in SMEs in developing countries

There is a belief that the adoption of e-commerce makes a contribution to the development of SME businesses in developing countries (Ghobakhloo et al., 2011). This is because of its ability to provide many benefits such as reducing costs; facilitating links to global markets; and improving operational efficiency (Lawrence and Tar, 2010, Al-Hudhaif and Alkubeyyer, 2011). The WTO (2013) reported that, through not engaging in e-commerce, SMEs would miss out on opportunities in both profitability and efficiency. Additionally, some researchers (i.e.,Humphrey et al., 2003, Vatanasakdakul et al., 2004) stated that, for developing countries, Internet based B2B e-commerce was expected to be a new driver of economic growth.

However, when compared generally to their peers in developed countries, SMEs, in developing countries, remain slow to adopt e-commerce (Suryani and Subagyo, 2011, Abou-Shouk et al., 2012, Alam et al., 2011). With regard to the adoption of e-commerce amongst Egyptian SMEs, recent studies found that Egyptian SMEs had

adopted only basic applications of e-commerce (i.e.,Abou-Shouk et al., 2012, Zaied, 2012).

Furthermore, Chitura et al. (2008) found that a key aspect to understanding the SMEs' adoption of B2B e-commerce was to consider the factors which affected the adoption process. There are many factors, such as the technology's characteristics; financial issues; organisational factors; environmental pressure and government policies, which affect SMEs adoption of B2B e-commerce (Thatcher et al., 2006, Wang and Lin, 2009, Al-Bakri et al., 2010, Sila and Dobni, 2012). The following two sections discuss the factors affecting SMEs' adoption of B2B e-commerce in developed and developing countries.

2.8 Factors affecting developed countries' SMEs adoption of B2B e-commerce

It is important for SMEs, which want to adopt B2B e-commerce, to evaluate all features of their technological, organisational, and environmental contexts since they need to identify the factors which will determine successful transformation.

Rover (1996) found that the SMEs ability' in adopting new Information Technology relied mainly on internal and external factors particular to the organisation. On the other hand, Fink (1998) suggested that Australian SME`s owners/ managers having a positive attitude towards IT might result in their organisations adopting new technology more easily. Similarly, Gagnon et al. (2000) studied the role of owners'/

managers' behaviours in SMEs` adoption of new IT. The study found that the owner/ manager had a significant influence on the adoption of new IT. Besides, some studies, such as (Hitt and Brynjolfsson, 1996, Sircar et al., 2000, Davern and Kauffman, 2000, Davies, 2003), showed that the SMEs' level of IT could have a direct effect on the process of adopting a new technology.

Moreover, Iacovou et al. (1995) showed that the basic factors, which might have a powerful effect on Canadian SMEs adopting EDI, were: organisational readiness; noticeable benefits of IT; and the external pressures caused by trading suppliers and partners. Studying the effects of technological, organisational and environmental characteristics on American SMES' adoption of IT, Premkumar and Roberts (1999) found that relative advantage; firm size; top management support; external support; and competitive pressure were the important determinants of American SMEs adopting IT.

Dholakia and Kshetri (2004) studied Internet adoption amongst American SMEs. They found that the adoption of the Internet was influenced by firm size; privacy-security; and environmental monitoring. They revealed that the Internet could extend the SMEs' operational efficiency and market share and increase their contribution to the American economy. Also, Grandon and Pearson (2004) studied the determinant factors of small and medium American companies adopting e-commerce. They revealed that the five factors, which affected the adoption of e-commerce, were: perceived usefulness; perceived ease of use; compatibility; organisational readiness; and external pressure.

Assessing the impacts of cultural, industrial, regulatory and governmental factors on initial stages of B2B e-commerce in Chinese, Hong Kong, Taiwanese and American SMEs, Zhu and Thatcher (2007) found that, at the beginning of the adoption B2B e-commerce, the most significant facilitators were government support and industrial encouragement. The cultural and current level of adoption was found, also, to have a significant effect on the adoption of B2B e-commerce. Al-Qirim (2007) studied New Zealand SMEs' adoption of e-commerce. Using the technology-environment-organisation (TEO) framework, the study found that compatibility, complexity, and the costs influenced the adoption of e-commerce. Suppliers/buyers pressure was found, also, to be an important environmental context affecting the adoption of e-commerce.

Bigne-Alcaniz et al. (2009) focused on the factors which affected Spanish SMEs adopting B2B e-commerce. They found that the previous experience factor affected significantly the adoption of B2B e-commerce. Therefore, in adopting B2B e-commerce, there is a need for time to understand the philosophy and essential changes which are required before using the system in an efficient way. They found, also, that the SMEs high usage of B2B e-commerce and, in turn, the high level of benefits had a positive effect on their commitment to continue use B2B e-commerce.

Wen and Chen (2010) investigated the factors influencing the American SMEs' adoption of E-business. Using the technology-organisation-environment (TOE) framework, the results revealed that technology readiness and competition intensity

had positive effects, whilst firm size had a negative impact on adoption. They found, also, that the regulatory environment and SMEs` financial resource appropriation for IT had no influence on the adoption of e-business.

Sila and Dobni (2012) studied the factors affecting North American SMEs' adoption of B2B e-commerce. Using the technology-environment-organisation (TEO) framework, the study found that The TOE framework provided an effective theoretical guide to studying B2B e-commerce. In addition, they revealed, also, that B2B e-commerce was affected by environmental complexity and competitive pressure. Moreover, they stated that Canadian SMEs' adoption rates of B2B e-commerce were below those of American SMEs.

However, in developing countries, SMEs face particularly issues dissimilar from those in developed countries and these vary significantly in adopting and benefiting from e-commerce (Tan et al., 2007, Ghobakhloo et al., 2011, Zaied, 2012). Although the studies found that e-commerce provided many benefits to SMEs, in many developing countries, they were still not adopting even minimal levels of e-commerce (Stockdale and Standing, 2006, Zaied, 2012, Abou-Shouk, 2012). The next section details the studies related to developing countries' SMEs adoption of e-commerce and clarifies the main reasons for SMEs being slow to adopt e-commerce.

2.9 Factors affecting developing countries' SMEs adoption of B2B e-commerce

In general, there are very positive statements about e-commerce. However, the potential advantages bring, also, some issues for developing countries. The e-commerce adoption in developing countries varies from one country to another. However, many developing countries' SMEs face a number of similar hindrances in the adoption of e-commerce (WTO, 2013). These are: the lack of financial, legal and physical infrastructures; qualified employees to use and develop e-commerce and related technology; awareness and skills between customers to use the Internet correctly; reliable and timely systems for the delivery of products/ services; the low use of bank accounts; the low rate of using credit cards; low incomes; and low penetration rates of computers and the Internet (Kapurubandara, 2009, Thulani et al., 2010, Zaied, 2012, WTO, 2013).

Additionally, the security concerns of the clients remain a significant obstacle to penetrating and expanding the implementation of e-commerce amongst firms in developing countries and especially SMEs. Possibly, the main drawback is the clients' unwillingness to give information about their credit cards. Besides, low-income internet markets, especially in Africa, have been unable to entice enough investment in this area. The variance of philosophy of business and cultures across developing countries has been known, also, as a limitation to transferring and applying e-commerce models designed by developed countries (WTO, 2013)

Moreover, Ching and Ellis (2004) examined the factors (e.g. decision-maker, Innovation, and environmental characteristics) which affected the process of adopting e-commerce amongst SMEs in Hong Kong. The results of their study showed that significant factors were relative advantage; compatibility; complexity; cost; supplier incentives; competitive intensity, and pressures from customers. In turn, these affected the adoption of e-commerce.

Additionally, Molla and Licker (2005) examined Southern African SMEs' adoption of e-commerce. They revealed that SMEs' slow adoption of e- commerce was caused by a lack of external and organisational readiness. Studying the Chinese SMEs owners'/ managers` attitudes to the adoption of e-commerce, Chen and McQueen (2008) revealed that the attitude of owner/ manager had an effect on the company's e-commerce expansion process. The high stage of adoption of e-commerce needs a more positive attitude by owners/managers towards the implementation of e-commerce.

According to Wan and Lin (2009), through their study, they tried to predict the factors which might influence the success implementation of B2B e-commerce since this was important when deciding whether to initiate B2B e-commerce. It helped Taiwan SMEs to predict whether or not implementation would be successful and to identify the necessary actions before implementing B2B e-commerce. Their study's analytical results showed that the three most effective factors were: industry characteristics; government policies; and management support. On the other hand, the three least effective factors were: firm size; organisational culture; and IT integration. They

mentioned, also, that the SMEs had to implement B2B e-commerce with care. In addition, Lawrence and Tar (2010) revealed that a lack of a national governmental ICT strategy; a lack of satisfactory basic infrastructures; and economic- socio factors were all significant obstacles to developing countries adopting e-commerce.

Studying the effects of technological, organisational and environmental contexts on Iranian manufacturing SMEs' adoption of e-commerce in, Ghobakhloo et al. (2011) found that relative advantage; compatibility; information intensity; management innovativeness; buyer/supplier pressure; technology vendors' support; and competition all affected the Iranian manufacturing SMEs' initial adoption of e-commerce.

Additionally, Lip-Sam and Hock-Eam (2011) studied the determinants of B2B e – commerce for Malaysian SMEs. Using the technology-environment-organisation (TEO) framework, the study found that external support and manager attributes affected significantly the Malaysian SMEs' adoption of B2B e-commerce. The results showed, also, that SMEs' owners or manager had an important role in the high level adoption of B2B e-commerce.

Studying the Chinese SMEs adoption of B2B e-commerce, Chong et al. (2011) found that the critical factors for success were successful customer relationships; global competition; information visibility; top management support and commitment ;information system/information technology infrastructure and performances; government encouragement and commitment; cultural consideration; and security

and trust. Halaweh (2011) studied the security factor's effect on the e-commerce adoption among Jordanian companies. The study found that security concerns were the main reason for Jordanian firms not adopting e-commerce.

In addition, the WTO (2013) reported that e-commerce could be achieved if there were satisfactory infrastructures. In most developing countries, this limitation represents a major hindrance. Joined with lack of competition, these bandwidth costs can be up to one hundred times more expensive than in developed countries. They stated, also that, in developing countries, most SMEs' owners/ manager of SMEs lacked the necessary skills and awareness to take full advantage of e-commerce and ICT.

In their study of Egyptian SMEs' adoption of e-commerce, El-Nawawy and Ismail (1999) investigated the factors which influenced e-commerce adoption in Egyptian SMEs. They found that the legal system; awareness and education; market size; telecommunications and e-commerce infrastructures; government issues; costs; and social issues were significant factors in Egyptian SMEs' adoption of e-commerce.

Zaied (2012) studied the barriers to the adoption of e-commerce adoption in Egyptian SMEs. The study found that the most significant barriers to the adoption of e-commerce were the technical, legal and regulatory issues; lack of Internet security; and limited use of Internet banking.

In addition, Abou Shouk (2012) found that there were three main factors which affected the Egyptian SMEs (travel agents) adoption of e-commerce. These were: the perceived benefits (e.g. Business internal efficiency benefits; competitive advantage), the perceived barriers (e.g. lack of technological readiness; lack of skilled labour; legal concerns and security issues; lack of public infrastructure readiness; and lack of external support and successful role models) and perceived environmental pressures (e.g. pressure from customers, pressures from competitors). He found, also, that there was a very low level of adoption of e-commerce amongst Egyptian SMEs (travel agents).

Furthermore, through his study, El-Gohary (2012) aimed to identify the factors affecting the adoption of Electronic Marketing (E-Marketing) by Egypt's small tourism companies. The study found that the most important factors affecting the Egyptian small tourism companies' adoption of E-marketing were internal factors (available resources; owner/manager skills; organisational culture; firm size; costs; ease of use; and compatibility) and external factors (cultural orientation towards E-Marketing by the organisation's customers; competitive pressures; market trends; government influence; and national infrastructure).

2.10 Factors affecting B2B e-commerce adoption in current study

The review of the literature demonstrates that most previous studies focused on a broad and generic view of SMEs' adoption of B2B e-commerce (see sections 2.8 and 2.9). However, this study aims to identify the actual level of B2B e-commerce adoption amongst American manufacturing SMEs as a pioneer developed country

leading the world in the adoption of B2B e-commerce, and in Egypt as a large developing country whose economy depends heavily on SMEs. In addition, it aims to identify the significant factors which influence each level of B2B e-commerce adoption.

Based on the literature review of the SMEs' adoption of e-commerce, this study determines three different categories of influencing factors. These are: technical factors; organisational factors and environmental factors. According to the specific factors, identified within the three contexts, they may vary across different studies For example:

Iacovou et al. (1995) proposed that the technological factors refer to the perceived benefits; the organisational factors refer to organisational readiness; and the environmental factors refer to external pressure.

Chau and Tam (1997) revealed that the technological factors include perceived barriers, perceived benefits; perceived importance of compliance to standards; interconnectivity and interoperability. The organisational factors involve satisfaction with the existing system; formalization on system development and management and the complexity of the IT infrastructure. The environmental factors refer to market uncertainty.

Teo et al. (1998) proposed that the technological context includes relative advantage and compatibility; the organisational context comprises of top management support,

technology policy and management risk position; and the environmental context includes information intensity, government support and competitive intensity.

Premkumar and Roberts (1999) suggested that relative advantage, cost, compatibility and complexity reflect the technology factors; the organisational factors refer to top management support, firm size and IT-expertise; and the environmental factors consist of competitive pressure, external support and vertical linkages.

Thong (1999) proposed that the technology context is concerned with compatibility, relative advantage and complexity; the organisational context is concerned with business size, employee`s IS knowledge and information intensity; and the environmental context is concerned with competition.

Kuan and chau (2001) revealed that the technological factors refer to perceived direct benefits and perceived indirect benefits; the organisational factors are concerned with perceived technical competence and perceived financial cost; and the environmental factors include perceived government pressure and perceived industry pressure.

Zhu et al. (2003) suggested that the technological context is concerned with technology competence; the organisational context consist firm scope and firm size; and the environmental context includes competitive pressure, consumer readiness and lack of trading partner readiness.

Zhu and Kraemer (2005) conceptualized that the technology context consists of technology competence; the organisational context is concerned with firm size, international scope and financial commitment; and the environment context refers to competitive pressure and regulatory support.

Chen et al. (2005) posited that the technological factors refer to relative advantage and the perceived importance of standard compliance; the organisational factors encompass scope and organisational culture; and the environmental factors comprise of government regulatory and competence intensity.

Zhu et al. (2006) proposed that the technology readiness and technology integration are within the technological context; firm size, global scope and managerial obstacles are within the organisational context; and competition intensity and regulatory environment are within the environmental context.

Lippert and Govindarajulu (2006) proposed that the technological factors refer to security concerns, reliability and deploy ability; the organisational factors are concerned with firm size, firm scope, technological knowledge and perceived benefits; and the environmental factors comprise competitive pressure, regulatory influence, dependent partner readiness and trust in web service provider.

Al-Qirim (2007) cited that the technology context includes relative advantage, compatibility and cost; the organisational context consist of firm size and information intensity of product and services; and the environmental context refers to

competition from other companies in the business, pressure from suppliers/buyers and external support from technology vendors.

Sarkar (2008) proposed that the technical factors refer to compatibility, IS expertise, IS security, cost benefits and perceived advantage; the organisational factors refer to user involvement and customer interaction; and the environmental factors refer to external pressure, competition in industry and external support.

Chong et al. (2008) posited that the factors, included under the technology context, are relative advantage, compatibility and complexity; the organisational context includes indicators of top management support and champion characteristics; and the environmental context consists of expectations of market trends and competitive pressure.

Scupola (2009) suggested that the technological context includes relative advantage and related technologies; the organisational context is concerned with CEOs characteristics and top management support, employees` IS knowledge and attitude and resource constraints; and the environmental context involves the government's role and the technology support infrastructure.

Salwani et al. (2009) proposed that the technology factors refer to technology competence; the organisational factors are concerned with firm size, firm scope, web-technology investment and managerial beliefs; and the environmental factors comprise regulatory support and pressure intensity.

According to Hassan et al. (2010), the technology context indicate to relative advantage, compatibility and complexity. Two factors, within the organisational context are top management support and employees` IS knowledge. Three factors, covered under the environmental context are competition intensity, partner readiness and external pressure.

Ghobakhloo et al. (2011) suggested that the technological factors include perceived relative advantage, perceived compatibility and cost; the organisational factors comprise information intensity, CEO s' IS knowledge, CEO's innovativeness and business size; and the environmental factors involve competition, buyer/supplier pressure and support from technology vendors.

According to Ifinedo (2011), the technology factors indicate to perceived benefit. Two factors, within the organisational factors are management commitment and support, and organisational IT competence. Three factors, covered under the environmental factors are external pressure, IS vendor support and pressure, and financial resources availability.

Duan et al. (2012) proposed that the technology factors refer to perceived direct benefit and perceived indirect benefit. Organisational factors are concerned with firm size, organisation readiness and top management support. The environmental factors comprise external pressure.

Sila (2013) suggested that the technological factors context includes cost, complexity, network reliability, data security and scalability; the organisational context comprise top management support, firm size, firm type, management level and trust; and the environmental context involves pressure from trading partners and pressure from competitors.

Elbeltagi et al. (2013) cited that the technology factors refer to relative advantage, compatibility, trialability, complexity, observability and cost; the organisational factors consist of IT expertise, application usage and information intensity; and the environmental factors refer to competition from other companies in the business, pressure from suppliers/ buyers, government role, public policy and external advice.

Based on the above discussions, relative advantage, compatibility and complexity were the most commonly considered factors representing the technology factors. Furthermore, a thorough literature review of the factors, which affected SMEs' adoption of e-commerce, showed that the most significant factors were relative advantage; compatibility and complexity (see Table 2-3). Therefore, these factors represent this study's technological factors, as shown in Table 2-4.

In addition, top management support and firm size were studied widely as factors which reflected the organisational factors. Additionally, a thorough literature review of the factors affecting SMEs' adoption of e-commerce demonstrated that the most significant factors included top management support and firm size, as illustrated in

Table 2-3. Thus, this study considers that these factors signified the organisational factors (see Table 2-4).

Also, the previous studies proposed, most frequently, that the environmental factors referred to competitive pressure, business partner pressure and government support. Moreover, a thorough literature review illustrated that significant environmental factors, which might influence SMEs' adoption of e-commerce were: competitive pressure, pressure from business partners such as buyers and suppliers and the role of government, as shown in Table 2-3. Therefore, this study included them in the environmental factors, as illustrated in Table 2-4.

Table 2-3: Summary of significant factors found in previous studies

Factors found to be important	Previous studies
-Relative advantage	(Iacovou et al., 1995) (Poon and Swatman, 1997) (Teo et al., 1998) (Poon and Swatman, 1998) (Poon and Swatman, 1999) (Premkumar and Roberts, 1999) (Kuan and Chau, 2001) (Beatty et al., 2001) (Mirchandani and Motwani, 2001) (Mehrtens et al., 2001) (Chwelos et al., 2001) (Riemenschneider et al., 2003) (Doolin et al., 2003) (Grandon and Pearson, 2004) (Ching and Ellis, 2004) (Wymer and Regan, 2005) (Powell et al., 2006) (Khemthong and Robert, 2006) (Ghobakhloo et al., 2011) (Abou-Shouk, 2012)
-Compatibility	(Teo et al., 1998)

	(Poon and Swatman, 1998) (Poon and Swatman, 1999) (Beatty et al., 2001) (Mirchandani and Motwani, 2001) (MacGregor and Vrazalic, 2004) (Ching and Ellis, 2004) (Al-Qirim, 2007) (Ghobakhloo et al., 2011) (El-Gohary, 2012)
-Top management support	(Poon and Swatman, 1999) (Premkumar and Roberts, 1999) (Mirchandani and Motwani, 2001) (Tsao et al., 2004) (Kartiwi and MacGregor, 2007) (Chitura et al., 2008) (Chen and McQueen, 2008) (Wang and Lin, 2009) (Ghobakhloo et al., 2011) (Lip-Sam and Hock-Eam, 2011) (Chong et al., 2011) (Elbeltagi et al., 2013)
-Firm size	(Iacovou et al., 1995) (Premkumar and Roberts, 1999) (Kuan and Chau, 2001) (Mirchandani and Motwani, 2001) (Mehrtens et al., 2001) (Chwelos et al., 2001) (Doolin et al., 2003) (Zhu et al., 2003) (Grandon and Pearson, 2004) (Dholakia and Kshetri, 2004) (MacGregor and Vrazalic, 2004) (Wymer and Regan, 2005) (El-Gohary, 2012)
-Competitive pressure	(Poon and Swatman, 1999) (Premkumar and Roberts, 1999) (Kuan and Chau, 2001) (Chwelos et al., 2001) (Mehrtens et al., 2001)) (Chang and Cheung, 2001) (Zhu et al., 2003) (Doolin et al., 2003) (Grandon and Pearson, 2004) (Ching and Ellis, 2004) (Wymer and Regan, 2005) (Wen and Chen, 2010) (Ghobakhloo et al., 2011)

	(Chong et al., 2011) (Abou-Shouk, 2012) (Sila and Dobni, 2012) (El-Gohary, 2012)
-Business partner pressure	(Iacovou et al., 1995) (Ching and Ellis, 2004) (Al-Qirim, 2007) (Ghobakhloo et al., 2011)
-Government support	(Kuan and Chau, 2001) (Premkumar and Roberts, 1999) (Chang and Cheung, 2001) (Grandon and Pearson, 2004) (Wymer and Regan, 2005) (Zhu and Thatcher, 2007) (Wang and Lin, 2009) (Lip-Sam and Hock-Eam, 2011) (Chong et al., 2011)

Table 2-4: Summary of adoption factors in the current study

Factors in this study	References
Technical factors	
1-Relative advantage	(Lacovou et al., 1995) (Poon and Swatman, 1997) (Teo et al., 1998) (Poon and Swatman, 1998) (Poon and Swatman, 1999) (Premkumar and Roberts, 1999) (Thong, 1999) (Akkeren and Cavaye, 1999) (Kuan and Chau, 2001) (Beatty et al., 2001) (Mirchandani and Motwani, 2001) (Mehrtens et al., 2001) (Chwelos et al., 2001) (Scupola, 2003) (Seyal and Rahman, 2003) (Riemenschneider et al., 2003) (Doolin et al., 2003) (Ching and Ellis, 2004) (Grandon and Pearson, 2004) (Teo and Ranganathan, 2004) (Tsao et al., 2004)

	(Wymer and Regan, 2005) (Kaynak et al., 2005) (Jean et al., 2006) (Khemthong and Robert, 2006) (Powell et al., 2006) (Al-Qirim, 2007) (JIA, 2008) (Sarkar, 2008) (Oh et al., 2009) (Ghobakhloo et al., 2011) (Abou-Shouk, 2012) (El-Gohary, 2012) (Elbeltagi et al., 2013)
2-Compatibility	(Teo et al., 1998) (Poon and Swatman, 1998) (Poon and Swatman, 1999) (Thong and Yap, 1999) (Premkumar and Roberts, 1999) (Beatty et al., 2001) (Mirchandani and Motwani, 2001) (Seyal and Rahman, 2003) (Ching and Ellis, 2004) (MacGregor and Vrazalic, 2004) (Jean et al., 2006) (Al-Qirim, 2007) (JIA, 2008) (Sarkar, 2008) (Ghobakhloo et al., 2011) (El-Gohary, 2012) (Elbeltagi et al., 2013)
3-Complexity	(Thong, 1999) (Premkumar and Roberts, 1999) (Seyal and Rahman, 2003) (Riemenschneider et al., 2003) (Ching and Ellis, 2004) (Jean et al., 2006) (Khemthong and Robert, 2006) (Al-Qirim, 2007) (JIA, 2008) (Oh et al., 2009)) (Elbeltagi et al., 2013)
Organisational factors	
1-Top management support	(Teo et al., 1998) (Thong and Yap, 1995) (Thong, 1999) (Poon and Swatman, 1999) (Premkumar and Roberts, 1999)

	(Mirchandani and Motwani, 2001) (Seyal and Rahman, 2003) (Levy and Powell, 2003) (Teo and Ranganathan, 2004) (Tsao et al., 2004) (Jean et al., 2006) (Al-Qirim, 2007) (Chuang et al., 2007) (Sarkar, 2008) (Chen and McQueen, 2008) (Wang and Lin, 2009) (Al-Bakri et al., 2010) (Ghobakhloo et al., 2011) (Lip-Sam and Hock-Eam, 2011) (Chong et al., 2011) (El-Gohary, 2012) (Elbeltagi et al., 2013)
2-Firm size	(Iacovou et al., 1995) (Thong and Yap, 1995) (Thong, 1999) (Premkumar and Roberts, 1999) (Akkeren and Cavaye, 1999) (Kuan and Chau, 2001) (Mirchandani and Motwani, 2001) (Mehrtens et al., 2001) (Chwelos et al., 2001) (Bertschek and Fryges, 2002) (Yao et al., 2003) (Scupola, 2003) (Seyal and Rahman, 2003) (Doolin et al., 2003) (Zhu et al., 2003) (Dholakia and Kshetri, 2004) (Grandon and Pearson, 2004) (MacGregor and Vrazalic, 2004) (Wymer and Regan, 2005) (Levenburg et al., 2005) (Buonanno et al., 2005) (Sarapovas and Cvilikas, 2006) (Jean et al., 2006) (Al-Qirim, 2007) (Chuang et al., 2007) (Wang and Lin, 2009) (Al-Bakri et al., 2010) (Wen and Chen, 2010) (El-Gohary, 2012)

Environmental factors	
1-Competitive pressure	(Iacovou et al., 1995) (Poon and Swatman, 1997) (Teo et al., 1998) (Poon and Swatman, 1998) (Poon and Swatman, 1999) (Premkumar and Roberts, 1999) (Thong, 1999) (Akkeren and Cavaye, 1999) (Kuan and Chau, 2001) (Beatty et al., 2001) (Mirchandani and Motwani, 2001) (Mehrtens et al., 2001) (Chwelos et al., 2001) (Scupola, 2003) (Seyal and Rahman, 2003) (Riemenschneider et al., 2003) (Doolin et al., 2003) (Grandon and Pearson, 2004) (Ching and Ellis, 2004) (Teo and Ranganathan, 2004) (Tsao et al., 2004) (Wymer and Regan, 2005) (Kaynak et al., 2005) (Jean et al., 2006) (Khemthong and Robert, 2006) (Powell et al., 2006) (Al-Qirim, 2007) (JIA, 2008) (Sarkar, 2008) (Oh et al., 2009) (Wen and Chen, 2010) (Ghobakhloo et al., 2011) (Chong et al., 2011) (Sila and Dobni, 2012) (Abou-Shouk, 2012) (El-Gohary, 2012) (Elbeltagi et al., 2013)
2-Business partner pressure	(Iacovou et al., 1995) (Kuan and Chau, 2001) (Scupola, 2003) (Looi, 2005) (Levy and Powell, 2003) (Ching and Ellis, 2004) (Al-Qirim, 2007) (JIA, 2008) (Bigne-Alcaniz et al., 2009)

	(Al-Bakri et al., 2010) (Ghobakhloo et al., 2011) (Abou-Shouk, 2012) (Elbeltagi et al., 2013)
3-Government support	(Teo et al., 1998) (Premkumar and Roberts, 1999) (Wirtz and Kam, 2001) (Kuan and Chau, 2001) (Chang and Cheung, 2001) (Kshetri and Dholakai, 2002) (Scupola, 2003) (Tsao et al., 2004) (Grandon and Pearson, 2004) (Wymer and Regan, 2005) (Jean et al., 2006) (Thatcher et al., 2006) (Zhu and Thatcher, 2007) (Sarkar, 2008) (JIA, 2008) (Wang and Lin, 2009) (Al-Bakri et al., 2010) (Lip-Sam and Hock-Eam, 2011) (Chong et al., 2011) (El-Gohary, 2012) (Elbeltagi et al., 2013)

2.11 B2B e-commerce implementation models

Researchers used Stage of growth models to describe organisations' use of IT (Chan and Swatman, 2004). The theory of e-commerce development stages emerged in the mid-1970s since researchers knew that Information Systems (IS) reserved a special position in organisations and played a particular role in businesses worldwide and that it was continuing to grow and expand (Gatautis and Neverauskas, 2005). Chan and Swatman (2004) stated that an organisation's understanding of the growing process of e-commerce implementation enhanced its ability to plan and to develop

the strategy for its information systems. This section describes different models of B2B e-commerce, e- commerce and another adoption IT used by SMEs.

The literature review identified different models for the adoption of e-commerce; the adoption of B2B e-commerce; and the adoption of other IT. Moersch (1995) created a conceptual framework which could measure the implementation levels of technology. He proposed seven implementation levels of technology. The level (0) does not show an acceptable access to technology based tools. The level (1) illustrates that computer-based applications are irrelevant to the instruction programme for individual members of staff. The level (2) demonstrates the instructional programme which uses technology- based tools as a supplement. At this level, electronic technology is regarded as either an extension activity or enrichment exercises to the instructional programme.

The level (3) shows the technology-based tools; these involve spreadsheets; databases; calculators; packages; desktop publishing application; multimedia application; and telecommunication application. Whilst level (4) includes integration; technology–based tools are integrated in ways which make available the existing rich context to understanding and solving authentic problems. Level (5) is the technology access which creates expansion via collaboration with other businesses. The last level (6) is refinement. The technology is dealt with as a process or a product (e.g. invention, patent, new software design), and as a tool for solving authentic problems.

Burgess and Cooper (1998) defined three stages. Stage one is promotion, organisations uses electronic channels to promote their products and services. Stage two is provision. This stage characterizes the increasing interaction between the business and its customers and includes an online enquiry, Frequently Asked Questions (FAQ) and e-mail. The third stage is processing which involves online sales; online payments; online orders; distribution links; and links to the warehouse order status enquiry. Also, it brings more integration into the perspective of the business relationship. Burgess and Cooper's model focuses on organisation activities and information technology tools for dividing the adoption of e-commerce into stages.

Allcock et al. (1999) identified four stages of Internet engagement. The first stage is called threshold in which there may be a computer but it is not ``wired up``. The next stage is beginner; there are one or two e-mail addresses, the user may access one or two websites; he/she lacks an understanding of range of applications and there are few networked computers. At the Intermediate stage, the Internet is used to solve specific business problems and the web is used for quick reference. Also, this stage includes an e-mail which is used to contact suppliers and a static website is used to advertise products and services. The last stage is the advanced stage which includes full internal and external use of e-mail and web use on internet, intranet and extranet.

Grant (1999) classified five stages for e-commerce maturity. The first stage is the Immaturity stage. This stage is described by little or no awareness about e-commerce and the Internet’s potential capabilities. The second stage is the Maturity stage

relating to activity on the Internet. In this stage, the Internet is used to search for information. The third stage is the establishment of temporal e-commerce strategy, whilst the fourth stage is preparation for implementation. In this stage, the enterprise shows readiness to implement an e-commerce strategy. The fifth stage is integrated and effective e-commerce. In this stage there is total integration between the Internet and Internet websites, and between the business process and information flows.

Willcocks' (2000) described the four-stages for moving to e-business; the first stage uses basic internet tools to develop web pages. In the second stage, termed 'transacting business,' web business systems are built. The third stage is labelled 'further integration. The fourth stage is e-business.

Heeks (2000) mentioned the four steps of development in e-commerce. The first two steps were called precursor activities. The first step is simple interaction. In this stage, the static data e-mail and simple website are used. The second step is dynamic information and the engagement of a dynamic website. The third and fourth steps are called e-commerce. The third step is ICT-mediated transactions. Finally, the fourth step is the ICT- mediated service delivery.

Earl (2000) described the six stages of e-business implementation. The first stage is external communication through a homepage. The second stage is internal communications. The third stage is e-commerce (e.g. B2C e-commerce, B2B e-

commerce). The fourth stage is e-business. The fifth and sixth stages are e-enterprise and transformation stage.

Mckay et al. (2000) presented a model called the SOG-e model which consisted of six stages. At the first stage, organisations may be characterized as adopting a wait and see approach. The Internet may be used by organisational members for communication purposes and may be used little for commercial purposes. Also, this stage may have the basic Internet facilities such as e-mail. At the second stage, there is established a static online presence. At this stage, organisations use the web to publish, for various client groups, information such as product and/or service information; company history; activities and sponsorship, recruitment opportunities; annual reports and shareholder information. The third stage is interactive online presence. This stage is the first stage in which an organisation enters into two-way communication and interaction with customers on the Internet. Internet channels such as e-mail, browsers and databases are used in this stage.

The fourth stage is internet commerce. At this stage, an organisation uses the Internet to complete transactions; online inquiries; orders; payments; and other services. The fifth stage is internal integration whereby progress has been made in integrating the front office Internet transaction capabilities and accompanying technologies with back office IS/IT business support systems and technologies. Finally, the sixth stage is external integration. At this stage, IT plays a key role in transforming entire business networks and extranet technologies are employed usefully. Also, IS /IT

are understood by all senior managers and the transformation of business networks becomes a major concern for many managers.

Wiertz (2001) described the four steps of e-commerce development. The first step is plain access. The second step is procurement oriented e-commerce. The third step is a website for promotional purposes, whilst the fourth step is orientated e-commerce.

Daniel et al. (2002a) developed four successive clusters in adopting e-commerce. The first cluster is developers. In this stage, an organisation uses the lowest levels of operational e-commerce services, such as e-mail, to communicate with customers and suppliers. Also, a website is used for advertising; brand building; and for providing information about the company and its products and/ or services. The second cluster is the communicators who use e-mail extensively to keep in touch with customers and suppliers, and they use e-mail for communications between employees. Also, this cluster focuses on the development of websites to provide information about the company and its services and/or products, and electronically exchanging documents and designs with customers and suppliers.

The third cluster is web presence. This cluster's activities are similar to the second cluster's with the exception that this cluster receive orders online. The last cluster is transactors. This group includes taking order online; providing after sales service or contact; undertaking enlistment online; receiving payments online; ordering and paying for purchasing inventory; and delivering digital goods online.

In their works, Rayport and Jaworski (2002) suggested that e-commerce development be divided into four stages. The first stage represents providing information, about the company, products and services to its customers. The second stage is interaction. At this stage, the Internet (e.g. e-mail, customer's interview and feedback) is used for interaction with customers, whilst the third stage is transactions which employ the Internet for transactions with customers. The fourth and final stage is co-operation (collaboration) which uses the Internet for intergenerational activity.

Rao et al. (2003) suggested the stage model of e-commerce development which included four stages. The first stage is a presence on the web which represents the first step in electronic commerce. In this stage, the organisations display their brochures and their offered products on a website. Since, as in this stage, organisations can enter in a digital environment via the presence stage, the organisation uses the web to provide information to its customers about the company, products and services and is a one-way communication to any potential user. Namely, this stage does not have internal and/or external processes. In addition, the presence is employed to attract new customers.

The second stage is the portal which includes two-way communication with customers or suppliers. Namely, this stage has the advantage of two-way communication between the businesses to customer (B2C) and/or between businesses (B2B). Another advantage, of this stage, is to link information to the displayed inventory data and the search abilities for the users.

The third stage is transaction integration which includes an electronic auction, an e-market place and, also, financial transactions between partners. Therefore, this stage requires higher technical abilities and IT infrastructures. At this stage, it is considered that there are low levels of collaboration and information sharing. The fourth stage is enterprise integration which comprises high collaboration levels between customers and suppliers; and full integration of B2B, B2C and value chain integration. Through this integration level, the company benefits from the e-commerce to manage customer relationship (CRM) and the supply chain Management (SCM). This integration level is e-commerce + CRM+SCM. In addition, this stage presents an ideal concept for the "e-world" environment. This stage model is different from the previous models because, in its last stage, it introduces high level of integration and connects e-commerce with CRM and SCM; consequently, it provides an ideal concept for the`` e-commerce `` environment.

Chan and Swatman (2004) proposed four stages of B2B e-commerce. The first stage is called early B2B e-commerce adoption which focuses on suppliers and aims to reduce costs. The second stage is centralized B2B e-commerce whereby the implementation goes company-wide with a focus towards clients. The third stage is looking inwards at the company itself for benefits. The fourth and final stage is global B2B e-commerce; in this stage, new technologies are adopted and the implementation of using the internet enables broad e-commerce coverage of business partners.

One study, which categorized comprehensively B2B e-commerce processes was conducted by Lefebvre et al. (2005). They developed a list of 36 e-business processes

(eBPs) to describe a six-stage model for the adoption of B2B e-commerce. Stage 00 represents non – adopters who do not have any intention to use B2B e-commerce activities. Stage 0 represents businesses which, currently, do not conduct any B2B e-commerce activities but have plans to do so in the future. Stage 1, 'electronic information search and creation', is classified as a beginner level and includes five eBPs. These are: seeking out new suppliers; seeking out products/services; seeking out new customers; advertising the company/services; and digitalizing information about products.

Stage 2, 'simple electronic transactions', is classified as the intermediate adoption level and encompasses seven eBPs. These are: accessing suppliers' product/service databases; placing/managing orders with suppliers; using electronic catalogues to buy products/services; accessing customers' product/service databases; receiving/managing customer orders; using electronic catalogues to sell products/services; and offering customers after-sales services. Stage 2 includes, also, stage 1.

Stage 3, 'complex electronic transactions', is classified as an upper-intermediate adoption level of B2B e-commerce. It comprises twelve eBPs. These are: accessing suppliers' inventories; negotiating contracts (price, volume) with suppliers; buying products/services via electronic auctions; buying products/services by issuing electronic calls for tenders; making electronic payments to suppliers; allowing suppliers to access the company's inventory; allowing customers to access the company's inventory; selling products/services via electronic auctions; selling

products/services by responding to electronic calls for tenders; negotiating contracts (price, volume) with customers; accessing customers' inventories; and receiving electronic payments from customers. Stage 3 includes, also, Stages 1 and 2.

Stage 4, the last stage, 'electronic collaboration', is classified as an advanced adoption level of B2B e-commerce. It includes a wider range of e-commerce abilities which are used to achieve e-commerce collaboration with customers and suppliers and comprises another twelve eBPs. In this stage, the eBPs are: transferring documents and technical drawings to suppliers; collaborating on online engineering with suppliers; transferring documents and technical drawings to customers; collaborating on online engineering with customers; integrating software supporting product design (e.g. CAD/CAM, VPDM); automating the production floor using a manufacturing execution system (MES); integrating the MES into the management information system; ensuring the management of quality assurance using the management information system; automating distribution/logistics using a logistics execution system (LES); allowing distribution/transportation partners to access the information they need (SKU, quantity turnaround, etc) in order to reduce distribution time and costs; optimizing returns management; and tracking sold or purchased products during transportation. The fourth stage includes, also, the first three stages.

Beck et al. (2005) mentioned four stages for e-commerce adoption. The first stage is online advertising. The second stage is online sales. The third stage is online procurement and the fourth and final stage is the use of EDI with suppliers and customers.

Gandhi (2006) proposed four stage of internet based adoption of e-commerce. The first stage is `` attract`` which involves sales promotions to attract customers. The second stage is the interaction between the organisation and its customers. The third stage is ``Act`` which includes order processing; delivery; and realization of payment. The fourth and final stage is ``react`` which involves after sales service on the basis of the customers' feedback.

Al-Qirim (2007) divided the adoption levels of e-commerce into three categories. The first category is starters who use the Internet (e.g. e-mail). The second category is adopters who employ e-mail, a website and Web Pages for selling and collecting money online. The third and final category is extended adopters who use the same techniques as adopters plus the intranet and the extranet. The lowest adoption level of e-commerce is the use of e-mail and passive web pages by starters and some adopters. On the other hand, the advanced adoption level of e-commerce is the residual adopters that use of e-mail and websites. This study classified the adoption levels of e-commerce in two ways. Firstly, the levels were categorized into three classifications such as starters, adopters and extended adopters. Secondly, the adoption levels were divided into low level and advanced level but this classification missed out the middle adoption level.

Chen and McQueen (2008) developed four stages of e-business. The first stage is the use of e-mail to communicate with clients, business partners and suppliers, and to search for information. The second stage is online marketing via a static website. The

third stage is online payments and ordering. The fourth and final stage comprises online transactions.

NCC (2009) suggested that there were five levels of e-commerce. At the first level, the company does not use e-mail; has no access to the internet; and does not have a website. At the second level, the company uses e-mail widely and has a website. At the third level, the company employs the internet to interact with clients. The fourth level comprises of online relationships with trade partners. The fifth and final level includes online exchanges and an e-marketplace for customers, trade partners and suppliers.

Recently, Abou-Shouk (2012) developed a model for the adoption of e-commerce which included four phases. The first phase is a static web presence which uses the Internet to search for customers, suppliers, competitors and information about new markets. At this phase, e-mail is used to contact customers, suppliers and business partners. The second phase is an interactive online presence which includes two-way interactions via the company portal (company- customers) and manages its orders with suppliers. This phase uses e-mail to receive customers' orders without e-payment. In addition, this phase comprises digital transfer of documents within the company. Static web presence and an interactive online presence are categorized, also, as low adoption levels of e-commerce. The third phase is Electronic transactions which includes online booking, online payments and digital services delivery. Electronic integration is the fourth and final phase. At this phase, there are after sales services and full internal and external use, namely, all employees use the intranet and

extranet is used to contact business partners. This phase has a high level of collaboration. The third and fourth phases are categorised as an advanced adoption level of e-commerce.

To sum up, most of these studies proposed and developed models for the adoption of e-commerce and e-business with the exception of Chan and Swatman (2004) and Lefebvre et al. (2005) who proposed models for the adoption of B2B e-commerce. However, Chan and Swatman (2004) tailored their model to study the stages of B2B e-commerce in Australian large companies like BHP Steel, whilst Lefebvre et al. (2005) tailored their model to study the levels of B2B e-commerce adoption in Canadian manufacturing SMEs.

Therefore, this research builds its model based on Lefebvre et al. (2005)'s previous work to study levels of B2B e-commerce adoption in USA manufacturing SMEs as developed country and Egyptian manufacturing SMEs as developing country. However, this study excludes the first two stages which focus on non-adopters and whether or not they are interested in adopting B2B e-commerce. Therefore, since this research studies only manufacturing SMEs which have websites, it adopts only the last four stages as shown in Table2-5.

Table 2-5: Stage model for adoption of B2B e-commerce

Business processes (eBPs)	Stage	Level
-Seek out new suppliers	1	Beginner

-Seek out products/ services -Advertise the company and/ or its products/services -Seek out new customers -Convert information on products/ services into digital form	Electronic information search and content creation	
-Buy products/ services using electronic catalogues - Placing and managing orders with suppliers -Access supplier's product/services databases -Sell products/ services using electronic catalogues -Receive and manage customer orders -Access customer's product/ service databases -Offer customers after-sales service	2 Electronic transaction	Intermediate
-Buy products/services by electronic auction -Buy products/services by issuing electronic calls for tenders -Negotiate contracts (price, volume, etc.) with suppliers -Make electronic payment to suppliers -Allow customers to access the company's inventories -Access customer's inventories -Allow suppliers to access the company's inventories -Access supplier's inventories -Sell products/services by electronic auction -Sell products/services by responding to electronic calls for tenders -Negotiate contracts (price, volume, etc.) with customers -Receive electronic payments from customers.	3 Complex electronic transactions	Upper-ntermediate
-Transfer documents and technical drawing to customers -Transfer documents and technical drawing to suppliers -Integrate software supporting product design (e.g. CAD/ CAM, VPDM, PDM) -Do collaborative on-line engineering with suppliers -Do collaborative on-line engineering with customers -Automate the production floor using manufacturing execution system(MES) -Integrate the MES into the management information system -Ensure the management of quality assurance using the management information system -Automate distribution/logistics using a logistics execution system (LES) -Allow distribution/ transportation partners to access the information they need (SKU, quantity turnaround, etc) in order to reduce time and costs related to distribution -Optimize returns management (``reverse logistics``) -Track products (purchased and sold) during transportation	4 Electronic collaboration	Advance

2.12 Definition of competitive advantage

Competitive advantage has a wide range of definitions. According to Ansoff (1965), competitive advantage has some features of unique opportunities within the field marked by the product-market scope and the growth sector. This competitive advantage tries to identify particular properties of individual product market that will provide a competitive position to the firm in turn. On the other hand, Hofer and Schendel (1978) described competitive advantage as the unique position developed by an organisation vis-à-vis its competitors.

In addition, Day (1984) defined competitive advantage as some combination of differentiation, cost superiority or operating in a protected niche which caused a positional superiority. In Porter's (1985) view, competitive advantage appeared in a firm's performance and organisation's ability to sustain, over its competitors within its industry or market, above average profits or performance. He regarded competitive advantage, also, as obtaining returns on investment consistently above the average for the industry. Furthermore, Schoemaker (1990) and Grant (1991) defined competitive advantage as a firm obtaining a higher rate of return than its competitors in a specific strategic field.

According to Peteraf (1993), competitive advantage is defined as maintaining above average returns. In addition, Dibb et al. (1994) regarded competitive advantage as a firm exceeding their competitors in matching a target market's needs and expectations.

Dehning and Stratopoulos (2002) and Davis et al. (2003) defined competitive advantage as the better use of performance than the competition in carrying out business activities. Whereas, Li et al. (2006) defined competitive advantage as an organisation having a defensible position over its competitors.

Besides, In Porter and Takeuchi`s (2000) and Berawi`s (2004) view, competitive advantage reflected the company's ability to provide consumers with greater value, either by offering lower prices or by giving more benefits and services which justified higher prices (Porter and Takeuchi, 2000, Berawi, 2004). Similarly, Stevenson (2009) defined competitive advantage as, when compared to its competitors, a firm's effectiveness in using organisational resources to satisfy customers` demand.

Moreover, Barney (2008) claimed that a firm had a competitive advantage when it was involved in activities which might increase the levels of efficiency or effectiveness not found in competing firms. Also, competitive advantage means creating more economic value than competitors.

Additionally, until the mid-1980, very few researchers such as Penrose (1959), Ansoff (1965), Andrews (1971) mentioned the term of competitive advantage and, in their works which did so, competitive advantage was defined in terms of what a firm was required to share in order to compete effectively.

Moreover, Gauss 1934`s principle of competitive Exclusion is considered to be the origin of the concept of competitive advantage (Herderson, 1989). In 1934, Gause,

the father of mathematical biology, declared that the`` results of his experiments when he put two protozoan of the same genus in a bottle supplied with food``. His hypothesis was that the animals could survive and endure together if they were of different species. They could not survive or exist if they were of the same species. These results led to Gause`s principle of `` competitive Exclusion`` which is that: no two animals, of the same species and which live in the identical ways, can coexist. Each one is required to be sufficiently different in order to have their own unique advantage.

The same idea is that a firm will challenge always and compete with competitors trying to obtain an advantage as result of a relative performance (Miller, 1993, Lumpkin and Dess, 1995). Besides, it is claimed that competitive advantage is a significant factor for firms in all industries (Porter, 2005). Therefore, companies should be concerned always with how to achieve a competitive advantage.

2.13 IT and competitive advantage

For SMEs, Information technology (IT) is one of the areas linked to competitive advantage. One goal of using IT is to support the firm's survival by employing internet technologies to keep ahead of competitors and to differentiate one's position in the global market. Therefore, the firm's management often consider IT as offering a chance to strengthen their competitive advantage (Remenyi, 1991). Many extant studies (i.e.,Bharadwaj et al., 1993, Mata et al., 1995, Teo and Pian, 2003, Pavic et al., 2007, Hazen and Byrd, 2012) focused on the relationship between adopting IT and

gaining competitive advantage. These studies concluded that IT was a competitive weapon and promoting IT, as a resource, enabled organisations to obtain a competitive advantage.

Furthermore, it is claimed that IT is not only a tool which can be used to obtain a competitive advantage but, also, it sustains and promotes such advantages (Porter, 1980). This section displays some of these empirical studies which focused on the relationship between the adoption of IT and competitive advantage.

Researchers carried out various studies in this area. Porter's (1980, 1985) work on strategic management for competitive advantage is considered to be the foundation of more research on investment in IT for competitive advantage. He referred to five competitive forces that any firm might face. These include: the threat of new competitors; the intensive rivalry amongst current competitors; pressure from alternative products; and the bargaining power of both buyers and suppliers. He developed, also, three general strategies to face these forces which included: cost leadership; differentiation; and focus.

McFarlan (1981, 1984) drew upon Porter's work to identify the current opportunities for strategic application of IT. He suggested that five questions should be asked in order to make an assessment for investment opportunities. These are the following:

1- Is technology a barrier against market entry?

2- Does technology have the ability to change the basis of competition?

3- Does technology help generate new products?

4- Has technology the ability to build in switching?

5- Has technology the ability to change the balance of power in the supplier relationship?

He suggested that if yes was the answer to one or more of these questions, IT represented a strategic resource which needed attention at the highest level. He presented, also, a strategic grid in which companies could establish the importance of IT within their organisation.

Parsons (1993) presented the ``Three-level Framework `` which attempted to `` help senior managers to assess the current and potential effect of IT on their business`` As indicated in Table 2.6, Parsons` framework was developed from the results of a two years study on more than a dozen companies. The managers use the framework to identify their competitive environments and business strategies. In particular, this framework focuses on the opportunities for firms to use IT to improve their competitive positions and provides, also, an insight into how IT can provide firms with a competitive advantage. As Parsons (1993) stated, in order that IT can become a viable competitive weapon, we must understand how IT can impact on the competitive environment and the business strategy, Such as an understanding will enable us to direct IT resources to the firms` most important targets.

Table2-6: Three–level impact of IT

Industry Level – The ability of IT to:	Firm Level- The Impact of IT on:	Strategic Level- The effect of IT on:
Change Industry Structure	Buyers	Cost Leadership
Create Competitive advantage	Suppliers	Differentiation
Spawn New Business	Substitution	Focus
	New Entrants	
	Rivalry	

Source: Parsons 1983, p4.

An industry level analysis may be carried out to determine how IT affects the nature of competition in the industry in which the firm competes. When IT affects the industry, it can do so in three ways. It may influence the nature of the industry's products/ services; the industry's markets; and / or the economics of production. As can be seen in Table 2-6 above, in an attempt to show IT's impact on a firm, Parsons (1993) used Porter's (1980) five competitive forces. These forces specify the industry's profitability and range of potential successful strategies (Porter, 1980). Parson (1993) claimed that this framework for competition was `` a useful vocabulary for defining the key subjects that may confront a firm today and in the future. Using this framework management shows how IT has the ability to change an industry structure through the competitive forces that control the shape that industry. ``

The strategic level is the third which attempts to determine how IT affects strategy. Parsons (1993) used Porter's (1980) three generic strategies which a firm might choose to implement. These include: cost leadership; differentiation; and segmentation within a cost leadership and differentiation strategy. IT is used to support, reinforce or enlarge this strategy. In addition, Parson's three-level framework allows the full effect of IT on the industry to be examined and whether or not the firm and strategy have demonstrated IT's potential to be used as a strategic weapon at all three levels.

Wiseman (1985) developed framework for `` identifying opportunities to gain a competitive edge, via use of modern information technology and, generally by adding value to the products and services currently offered to clients``(Wiseman and MacMillan, 1985). Wiseman believed that, by using his model, the firms could generate more than 100 options for using IT to create a competitive edge. He stated, `` in my experience not one company that has seriously attempted to find such an edge has failed to do so. `

Wiseman suggested that a competitive edge resulted from ` strategic thrusts` founded on the logic of Chandler's growth strategies and Porter's competitive strategy framework". This ` strategic thrust` is a major move which an enterprise undertakes in its search for an advantage. By supporting or shaping a strategic thrust, IT supports or shapes the firm's efforts to obtain a competitive advantage. Therefore, a strategic thrust is a critical interface which joins competitive strategy with IT.

Strategic thrusts include five generic strategic: differentiation, cost, innovation, growth and alliances. These generic strategic thrusts manifest strategic.

Porter and Millar (1985) developed an information intensity matrix in order to identify IT investment opportunities related to the use of technology along the value chain. This matrix is intended to help firms to identify strategic investment opportunities offering as well as developing products. Depending on the products' information contents and the information intensity of the value chain, the matrix is more likely to be used for identifying cross- sectional opportunities for investment.

Runge (1985) developed an opportunities matrix for the exploitation of telecommunication-based information systems through linking the firm with its customers to achieve competitive advantage.

Clemons and Kimbrough (1986) suggested that Strategic Information Systems consisted of three features. Firstly, these systems may reduce costs or provide value to customers or benefits to users. Secondly, users incur significant switching costs when changing to systems which competitors offer. Thirdly, there is a short adoption time when compared to the time needed by a competitor to copy the system. Consequently, this creates an opportunity for early developers to develop their initial bases of users.

Ward (1988) classified into four types the strategic/competitive advantage opportunities through IT. These are:

1- Connecting the organisation with customers, suppliers and consumers of its products and services. This might be achieved merely by either placing a terminal in the customer's premises for order entry, enquiry etc. or more sophisticated systems to manage their own businesses.

2- Producing the use of information in the organisation's value adding process. The organisation is required to understand the information needs of the whole industry and not only to understand the information needs of its own business.

3- Enabling the organisation to develop this strategy. Gibson (1989) and Weston and Brigham (1993) revealed that the investment in IT produce, market and delivered new or enhanced products or services depending on information.

4- Also, it provides senior management with information to give full support to strategic decision making and implementation

In summary, it grants three primary pay offs. These are: lower costs to produce goods and services; increased quality in produced outputs; and increased efficiency in turning acquired resources into goods and services for customers.

Clemons and Row (1991) investigated, from the viewpoint of IT innovation, the sustainability of competitive advantage and the differences between competitors in the role played by strategic resources. Using the argument that, nowadays, IT equipment and services are quite commonly widespread with most applications copied easily, they suggested that a sustainable competitive advantage could be gained when IT was more likely to strengthen the differences taking place in these resources. Specifically, plant and equipment, customer relationships, and brand

recognition may be involved in strategic resources. They continued to assure that, if IT made full use of a firm's unique resources to prevent imitations from competitors, the innovating firm would enjoy an advantage.

Bharadwaj et al. (1993) stated that the potential sources of competitive advantage for service organisations were IT and implementation skills; corporate culture; scale; brand quality; and functional skills. This means that IT is one of strategic sources for sustainable competitive advantage which the service organisations can use to generate their competitive advantages. In their study of Australian SMEs, Poon and Swatman (1999) found that competitive advantages, gained from conducting e-commerce over the internet.

Colgate (1998) stated that banks could create sustainable competitive advantages through marketing information systems technology. He suggested that the marketing information system technology could provide banks with a competitive advantage which was not easily imitated and could strengthen the relationship with customers; reduce perceived risks; facilitate cross-selling; establish switching costs; establish customers' profitability; create barriers to entry and retain customers. In addition, he mentioned MIST as one way of IT creating a sustainable competitive advantage within the marketing function since it could create a sustainable competitive advantage. There was empirical evidence from 48 postal questionnaires which were conducted in banks in the UK and Ireland and ten case studies which were undertaken in the UK, USA, and Australia.

Through an exploratory analysis, Byrd and Turner (2001) discussed the relationship between a flexible IT infrastructure and competitive advantage. They found that there was a positive relationship between a flexible IT infrastructure and competitive advantage. This study used four dimension of competitive advantage, namely: innovativeness; market position; mass customization; and the difficulty of duplication. In addition, it was carried out in different industry types such as manufacturing, Insurance, health services, banking and others, and with different sizes of organisation.

Furthermore, Damanpour and Damanpour (2001) found that adopting e-business produced competitive advantages in terms of increasing efficiency in integrating suppliers and vendors; information management; lowering transaction costs; and improving distribution and marketing coverage.

Zhang and Lado (2001) used organisational competencies as dimensions for competitive advantage because they claimed that IS might contribute to competitive advantage and that it could be understood with reference to its effect on the process of developing and utilising distinctive organisational competencies. Their analysis showed that information systems might play an essential part in making organisations develop and strengthen these organisational competencies.

Three progressive levels, to which organisations develop trying to seek and follow e-commerce strategies, were identified by Straub and Klein (2001). The initial level aims to cut costs and/or raise productivity. The next level concentrates on using e-

commerce in order to access new customers and markets. Gains at the previous levels are built upon the third level; firms look forward to sustainable competitive advantage trying hard to accomplish a complete integration of e-commerce into the firm's overall business strategy. Most large organisations promote to the third level objectives, while SMEs on the first and second levels. Greater complexity and risk are reflected at the third level.

Teo and Pian (2003) investigated Singaporean firms' adoption of the internet and how this affected competitive advantages. The study found that the adoption of the internet provided competitive advantage through various routes. These included differentiation, cost reduction; innovation; growth; and alliance.

In addition, Mustaffa and Beaumont (2004) demonstrated how adopting e-commerce can help Australian small businesses to grow (increasing market share; and expanding the offered range of products and/or services). In the long run, the adoption of e-commerce helps SMEs to generate revenue; to reduce costs; and to improve their competitive advantage. This is achieved by attracting new customers; expanding local markets; keeping in touch with customers, suppliers, business partners and employees; and giving them the option of holding less inventory.

Furthermore, in Porter's (2005) study on how internet usage affected competitive advantage in the UK retail banking sector, he suggested that the key factors, which provided competitive advantage, were differentiation; reduction in costs and product uniqueness. He concluded that reduction in costs; brand image, service quality, and

customer satisfaction were the dimensions of competitive advantage which banks could gain from adopting the internet.

Blount et al. (2005) analyzed the Human Resource Management (HRM) strategies which were developed specifically to suit the changing customer service practices connected with B2C e-commerce in the retail banking sector. The study was conducted in both a small and large Australian bank. These banks were connected between their e-commerce strategies and the overall business strategy. The study aimed to identify and pinpoint the HRM strategies which helped them to make use of their e-commerce capability in order to accomplish sustainable competitive advantage. They found that the AUB and Lawson Central bank operated in different but overlapping markets. Apparently, both banks had implemented e-commerce successfully but they pursued very different HR strategies. Both banks were profitable and there were signs that this would continue. This suggested that linkage, between HRM and e-commerce strategies, to achieve competitive advantage may be implemented in different ways. This study linked HRM and e-commerce to achieve competitive advantage and used market share and profitability as dimension for competitive advantage.

Molla and Bhalla (2006) examined the relationship between enterprise resource planning (ERP) and competitive advantage. The study's results demonstrated that ERP made the case for the organisation accomplishing competitive advantage but they considered that the physical technology was not the only cause. There are some factors that help the implementation of ERP to obtain competitive advantage.

Amongst these factor are: being the pioneer; an explicit vision and communication; organisational learning; managerial coordination; trust between managers; organisational flexibility; commitment; innovative use of ERP systems; and motivated staff. Competitive advantage was measured by leadership costs, differentiated products; and operational efficiency.

Aldmour (2007) has examined the relationship between Information and Communication Technology (ICT) and competitive advantage. The aim of this study was to examine the real benefit of ICT and its impact on competitive advantage. In addition, it was to discover the factors which had effects on ICT diffusion and competitive advantage. The study was carried out in Jordanian manufacturing companies and interviews and document analysis were used to gather the data. The results showed that ICT was a source of competitive advantage in manufacturing companies. Most organisations follow four strategies to achieve competitive advantage. These are: cost strategy; speed strategy; quality strategy; and flexibility strategy. Moreover, the researcher measured and assessed competitive advantage by market share; customer satisfaction; and organisational profitability.

Furthermore, she suggested that, for companies, sustained competitive advantage had to be based on reputation and quality of customer service; information feedback; low costs and prices; good coordination; marketing skills; continuous development; good relationship with distributors, suppliers and customers; and technical development.

Moreover, in their study on UK SMEs, Pavic et al. (2007) found that e-business helped companies to create competitive advantages. They used 9 case studies to collect data from UK SMEs.

N`Da et al. (2008) examined the advantage of B2B e-commerce and the determinants of this advantage. This study was conducted in 143 Canadian companies and used a questionnaire to collect the data. They found that the most essential advantage of B2B e-commerce was increased productivity; increased quality of products and services; competitive advantage; and, also, sales growth and increased revenues. On the other hand, reductions in costs were not of the same importance. The basic determinants of the advantages of B2B e-commerce involve the kind of B2B e-commerce used and the internal and external integrations of applying B2B e-commerce.

B2B e-commerce advantage is affected indirectly by the organisation's strategic orientation and the organisational context. This study shows empirical evidence to confirm that the organisations' use of B2B e-commerce generated advantages like increasing productivity; increasing quality of products and services; and competitive advantage. In addition, competitive advantage was accounted for as benefits achieved via the use of B2B e-commerce. Competitive advantage could be measured by the customers' loyalty; increased market share; the development of new products and services and the pre-emptive entry to the market.

Bhatt et al. (2010) examined how the flexibility of an organisation's IT infrastructure impacted on competitive advantage. The results showed that the IT contributed indirectly to the organisation's competitive advantage. In this study, financial performance, sales growth and profitability were the dimension which represented competitive advantage.

Ussahawanitchakit and Intakhan (2011) investigated Thailand firms' adoption of e-commerce and how it affected competitive advantages. The study found that the e-commerce adoption had a positive and significant relationship with competitive advantage. Similarly, competitive advantage had a significantly positive effect on a firm's performance and marketing effectiveness which had an important positive influence on the firm's performance.

Furthermore, Hazen and Byrd (2012) found that adopting IT produced competitive advantages in terms of increasing levels of efficiency and effectiveness. Although the extant studies investigated the adoption of IT and how it affected competitive advantage, they did not distinguish between the competitive advantages achieved by each level of IT adoption. Therefore, this study fills the gap in the literature by studying how each level of B2B e-commerce adoption affects the creation of competitive advantage in manufacturing SMEs. In addition, this study compares these levels of adoption and their effects on competitive advantage in a developed country (the USA) and a developing country (Egypt).

Forthermore, Porter and Millar (1985) suggested that, during the information systems planning process, the measurement of competitive advantage is essential in choosing between the IT application candidates. Sethi and King (1994) cited the measurement of competitive advantage to be the most important and is required to demonstrate and justify the value of IT to top management. Furthermore, competitive advantage measures are required, also, in conducting empirical studies which involved IT applications (Bakos, 1987). In addition, Ghemawat (1986) suggested that the measures are necessary to understand further concepts such as sustainability and contestable competitive advantage.

This study aims to develop a set of measures of competitive advantage as provided by the adoption of B2B e-commerce. In attaining this objective, this study focuses on the previous studies which linked IT and competitive advantage in order to identify the key dimensions of competitive advantage provided by the application of IT. The previous studies used a number of different types of dimensions in measuring competitive advantage, for instance:

- Wiseman and Macmillan (1985) used cost, differentiation and innovation as dimensions of competitive advantage.

- According to Porter and Millar (1985), cost and differentiation were employed as dimensions of competitive advantage.

- Lederer et al. (1997) used differentiation and cost to measure competitive advantage.

- Colgate (1998) used strong customer relationship, reducing perceived risk, cross-selling, switching costs, profitability and retaining customer as dimensions of competitive advantage.

- Kearns and Lederer (2000, 2004) used the following eight items to measure competitive advantage: provide advantages such as lower costs or product differentiation, influence the buyer` s decision to switch to our products, leverage unique firm capabilities, enable existing business strategies, create new business strategies, make it more costly for our customers to change suppliers, establish electronic links with suppliers or customers, create barriers to keep competitors from entering our markets.

- Byrd and Turner (2001) measured competitive advantage by means of the following four dimensions: innovativeness; market position; mass customization; and the difficulty of duplication.

- Dehning and Stratopoulos (2002) used lower costs; quality; and efficiency as dimensions of competitive advantage.

- Lumpkin et al. (2002) used cost leadership and differentiation as dimensions of competitive advantage.

- Teo and Pian (2003) used the following five dimensions to measure competitive advantage: differentiation; reduction in costs; innovation; growth and alliance.

- As dimensions of competitive advantage, Dunk (2004) used the unit cost of manufacturing; fast delivery; flexibility to change the volume; inventory turnover; and cycle time.

- Evans and Smith (2004) employed costs; the growth rate of sales; and profit as dimensions to measure competitive advantage.

- Mustaffa and Beaumont (2004) used growth (e.g. increasing market share, expanding the range of offered products and/or services offered) as dimension of competitive advantage.

- According to Koh and Tan (2005), reduction in costs, quality of service and efficiency were used as dimension of competitive advantage.

- Blount et al. (2005) used market share and profitable as dimension of competitive advantage.

- In his (2005) study, Porter used reduction in costs; brand differentiation; service differentiation; enhanced customer base; and cross-selling as dimensions of competitive advantage.

- Molla and Bhalla (2006) measured competitive advantage by means of leadership costs; differentiated products; and operational efficiency.

- Zhuang and Lederer (2006) used sales growth and profitability as dimensions of competitive advantage.

- According to Lai et al. (2006), competitive advantage is expressed in terms of cost advantage; service variety advantage; and service quality advantage.

- Aldhmour (2007) measured competitive advantage by means of market share; customer satisfaction; and profitability.

- In N`Da et al.'s (2008) study, competitive advantage was measured by customer loyalty; increased market share; development of new products and services; and the pre-emptive entry into the market.

- Krell and Matook (2009) used cost reduction as a dimension of competitive advantage.

- Yew Wong and Karia (2010) used profit growth and revenue growth as dimensions of competitive advantage.

- Aranyossy (2010) used market share; sales revenue growth; profitability; costs; productivity; and inventory turnover as dimensions for competitive advantage.

- Bhatt et al. (2010) used financial performance, sales growth and profitability as dimensions of competitive advantage.

- Ussahawanitchakit and Intakhan (2011), cost reduction, differentiation and value chain were employed as dimensions of competitive advantage.

- Hazen and Byrd (2012) measured competitive advantage by means of two dimensions: efficiency; and effectiveness.

Based on the above previous studies, competitive advantage is broadly expressed in terms of cost reduction; differentiation; growth; and quality. Therefore, this study uses cost reduction; differentiation; growth; and quality as dimensions to measure competitive advantage.

2.14 Summary

In the USA, SMEs are an important part of the economy with 27.8 million businesses or 99% of all companies. They create about 65% of net new private sector jobs and employ over half of the private sector's employees (OECD, 2012). As regards Egyptian SMEs, they are major job providers; they create an important share of total added value and provide a great number of poor people and middle-income people with

affordable goods and services. Additionally, 99% of Egyptian enterprises are small (employing between 1 and 49 workers). In addition, this chapter provided a general background related to B2B e-commerce and competitive advantage. It tried to cover, in more detail, some subjects related to B2B e-commerce. These were such as: definitions of B2B e-commerce; benefits of B2B e-commerce; the adoption of B2B e-commerce and its levels; and the factors which impacted on the process of adopting B2B e-commerce. Moreover, this chapter attempted, also, to cover some issues which were connected to competitive advantage such as the concept of competitive advantage and relationship between IT and competitive advantage.

Chapter 3: General theories of adoption of technology, conceptual model and hypotheses

3.1 Introduction

It is significant to understand the theoretical underpinning on which the research model and hypotheses are built. This chapter aims to review some technology adoption theories like the technology acceptance model (TAM), the innovation diffusion theory (IDT) and the technology-organisation-environment frameworks (TOE). Additionally, it describes the study's conceptual framework and hypotheses. Finally, it presents a summary of this chapter.

3.2 Technology acceptance model (TAM)

The technology acceptance model (TAM) is used to determine the factors causing the adoption of IT to be either accepted or rejected (Jaidee and Beaumont, 2003). The original version of the technology acceptance model (TAM) is an adaptation of the theory of reasoned action (TRA); this was made particularly for modelling the acceptance of adopting technology (Davis et al., 1989, Riemenschneider et al., 2003, Al-Bakri et al., 2010). The model tries to explain the decisions around the adoption of technology by considering the effect of external elements on attitudes; internal beliefs; and intentions (Jaidee and Beaumont, 2003). Davis (1986, 1989) found that TAM contained the most essential two variables: namely, perceived usefulness; and perceived ease of use.

Through their studies, Davis (1989) and Davis et al. (1989) confirmed that, compared to perceived ease of use, perceived usefulness was linked more strongly to the adoption of IT and usage because, in order to gain the benefits from adopting IT, the

organisations might be willing to adopt and make use of more complicated technology.

The above discussion reveals that TAM can contribute to examining the effects of technological features (e.g. perceived usefulness, perceived ease of use) on the process of adopting B2B e-commerce. However, in adopting IT (e.g. B2B e-commerce), it ignores the role of organisational features and environmental features. Therefore, this study does not depend on TAM to explain the relationship between the adoption of B2B e-commerce and the factors which affect it.

3.3 Innovation diffusion theory (IDT)

Rogers (1995) established the innovation diffusion theory. This theory contains five factors which are: relative advantage; compatibility; trail-ability; observable and complexity. These factors are used to assess the proposed innovation and to decide whether or not to adopt the new IT (Rogers, 1995, Kendall et al., 2001). Furthermore, Bradford and Florin (2003) used Rogers' model and they ensured, also, that technical compatibility, technical complexity and relative advantage were the three major factors which might affect the adoption of IT.

Moreover, Fichman (1992) and Chen et al. (2005) suggested that this theory could not make predictions about the adoption of complex systems. This is because it focuses only on technological factors, whilst this study examines the effect of organisational factors, technological factors and environmental factors on the adoption of B2B e-commerce. It was suggested that studying the adoption and implementation of IT

required organisational, technological and environmental considerations (Chen et al., 2005). In addition, it described SMEs as having: a high reliance on trade partners (Chwelos et al., 2001); lacking technical knowledge and expertise (Barry and Milner, 2002); and an insufficiency of funds and organisational planning (Raymond, 2001). These unique features of SMEs ensure that there is the need for a comprehensive theory to understand the technological, organisational and environmental facets of adopting IT (Fink, 1998, Duan et al., 2012). Tornatzky and Fleischer (1990) provided a theoretical framework comprising these three elements which might impact on the adoption of IT. The next section discusses this theory.

3.4 Technology-organisation-environment frameworks (TOE)

Tornatzky and Fleischer (1990) developed the technology-organisation-environment (TOE) framework. It is a comprehensive framework for studying firms' adoption of technology. The framework tries to examine the effects of technology, organisation and environment aspects on adoption of IT. According to the technology-organisation-environment (TOE) framework, the technological, the organisational and the environmental contexts affect the process of adopting IT. These three contexts represent both constraints and opportunities for technological innovation.

The technological context is connected to technologies available to the organisation; essentially, it is interested in how technology characteristics, themselves, affect the adoption process. The organisational context describes a firm's characteristics. Amongst all of the common organisational characteristics are: firm size; degree of centralization; formalization; complexity of its managerial structure; the quality of its

human resources; and the amount of slack resources available internally. Environmental context is the place where an organisation accomplishes its business. This involves the general industry scenario; pressures from competitors and business partners; and the relationship with government.

Many empirical studies used the TOE framework in respect of SMEs' adopting different technologies (see Table 3-1). For example, Iacovou et al. (1995) used the TOE framework to reveal the determinants of small and medium companies' adopting EDI. They found that significant factors, in the adoption of this technology, were the external pressures; perceived benefits, and organisational readiness.

In addition, Premkumar and Roberts (1999) adopted the TOE framework to investigate small and medium businesses' adoption of IT. Their results showed that the critical factors for the adoption of IT were the relative advantages; top management support; firm size; and external pressures. Mehrtens et al. (2001) used the TOE framework to study SMEs' adoption of the internet. Furthermore, Ghobakhloo et al. (2011) confirmed the appropriateness of the TOE framework for studying manufacturing SMEs' adoption of e-commerce. Also, Ramdani et al. (2009) adopted the TOE framework in investigating UK SMEs' adoption of enterprise systems.

Moreover, Duan et al. (2012) used the TOE framework to develop a model which could be used to study the critical factors for Australian SMEs adopting the e-market. Through his study, Ifinedo (2011) found the TOE framework useful in studying the e-

business adopting in Canadian SMEs. Additionally, in his study of American SMEs, Sila (2013) found that the TOE framework provided a strong foundation for studying B2B e-commerce.

The above mentioned empirical research shows the applicability of the technology-organisation-environment (TOE) framework in studying SMEs' adoption of technology. Table3-1 sums up the relevant studies which depend on the TOE framework.

Table 3-1: Previous studies using the TOE framework

Reference/ innovation adoption	Factors examined	TOE framework		
		T	O	E
(Grover and Goslar, 1993)/ EDI	-Organisational factors (IS- related factors, firm size) -Environmental factors (market assessment, competitive need) -Inter organisational factors (compatibility, complexity) -Support factors(top management support)	✓	✓	✓
(Iacovou et al., 1995)/ EDI	-Technological context (perceived benefits) -Organisational context (organisational readiness) -Environmental context (external pressure)	✓	✓	✓
(Chau and Tam, 1997)/open system adoption	-Characteristics of the innovation(perceived benefits, perceived barriers, perceived importance of compliance) -Organisation (satisfaction with existing systems, formalization on system development and management, complexity of IT infrastructure) -External environment(market uncertainty)	✓	✓	✓

(Thong, 1999), IT adoption	-CEO characteristics (CEO`s innovativeness and IS knowledge) -Innovation characteristics (relative advantage, compatibility, complexity) -Organisational characteristics (size and employee`s IS knowledge)	✓	✓	
(Ramamurthy et al., 1999)/ EDI	-Organisational factors(management support, expected benefits, resource intensity, compatibility, cost) -Inter-organisational factors (competitive pressure, customer support)	✓	✓	✓
(Premkumar and Roberts, 1999) /IT adoption	- Innovation characteristics (relative advantage, complexity, compatibility, and cost) - organisational characteristics (top management support, firm size, and IT expertise) -environmental characteristics (competitive pressure, external support, and vertical linkages)	✓	✓	✓
(Kuan and Chau, 2001)/ EDI	-Technological context (perceived direct benefits) -Organisational context (perceived financial cost, perceived technical competence) -Environmental context (perceived industry pressure, perceived government pressure)	✓	✓	✓
(Mehrtens et al., 2001)/ Internet adoption	-Perceived benefits -Organisational readiness -External pressure	✓	✓	✓
(Zhu et al., 2003)/ e-business	-Technological context (technology competence) -Organisational context (firm scope, firm size) -Environmental context (consumer readiness, competitive pressure, lack of trading partner readiness)	✓	✓	✓
(Zhu et al., 2004)/ e-business	-Technological context (technology readiness) -Organisational context (firm size, global scope, financial resource) -Environmental context (competition intensity, regulatory	✓	✓	✓

	environment)			
(Chen et al., 2005)/B2B e-commerce	-Technological context (perceived benefits, perceived barriers, perceived importance of standard compliance) -Organisational context (scope, organisational culture -Environmental context (government regulatory, competence intensity)	✓	✓	✓
(Zhu and Kraemer, 2005)/ e-business	-Technology context (technology competence) -Organisation context (size, international scope, financial commitment) -Environment context (competitive pressure, regulatory support)	✓	✓	✓
(Zhu et al., 2006)/e-business	-Technological context (technology readiness, technology integration) -Organisational context (firm size, global scope, managerial obstacles) -Environmental context (competition intensity, regulatory environment)	✓	✓	✓
(Lippert and Govindarajulu, 2006) / web adoption	-Technological context (security concerns, reliability, deploy ability) -Organisational context (firm size, firm scope, technological knowledge, perceived benefits) -Environment context (competitive pressure, regulatory influence, dependent partner readiness, trust in web service provider)	✓	✓	✓
(JIA, 2008)/ e-commerce	-Technology (relative advantage, compatibility, complexity) -Organisation (organisational readiness, leadership, the core business activity and information intensity, innovation champion) -Environment (competitive pressure, business partner pressure, internationalization, government, support from technology vendors)	✓	✓	✓

(Scupola, 2009)/ e-commerce	-Technological context (e-commerce relative advantage, e-commerce related technologies) -Organisational context (CEOs characteristics and top management support, employee`s knowledge and attitude, resource constraints) -External environment (role of government, technology support infrastructure)	✓	✓	✓
(Alawneh and Hattab, 2009)/ e-business	-Technological context (technology readiness) -Organisational context (firm size, financial resource, IT/ Business Strategy, IT professional, online revenues) -Environmental context (competition intensity, regulatory support environment)	✓	✓	✓
(Ramdani et al., 2009)/ enterprise systems	-Technological context (relative advantage, compatibility, complexity, trialability, and observability) -Organisational context (top management support, organisational readiness, firm size, and IS experience) -Environmental context (industry, market scope, competitive pressure, and external IS support)	✓	✓	✓
(Hassan et al., 2010)/ e-procurement	-Technology (relative advantage, compatibility, complexity) -Organisation (top management support, employee`s IS knowledge) -Environment (competition intensity, partner readiness, external pressure)	✓	✓	✓
(Ghobakhloo et al., 2011)/ e-commerce	- Technological context (Perceived relative advantage, Perceived compatibility, and Cost) - Organisational context (Information intensity, CEO s' IS knowledge, CEO's innovativeness, and Business size) - Environmental context (Competition, Buyer/supplier	✓	✓	✓

	pressure, and support from technology vendors)			
(Ifinedo, 2011)/ e-business	-Technological context (perceived benefit) -Organisational context (management commitment and support, and organisational IT competence) -Environment context (external pressure, IS vendor support and pressure, and financial resources availability)	✓	✓	✓
(Duan et al., 2012) / e-market	- Technology Context (Perceived Direct Benefit, and Perceived Indirect Benefit) - Organisation Context (firm size, Organisation Readiness, and Top Management Support) - Environment Context (external pressure) - Trust Context (E-market Trust, and Trading Partner Trust)	✓	✓	✓
(Sila, 2013)/ B2B e-commerce	-Technological context (Cost, complexity, network reliability, data security, and scalability) -Organisational context (top management support, firm size, firm type, management level, and trust) -Environmental context (pressure from trading partners, and pressure from competitors)	✓	✓	✓

As displayed in Table 3-1, these studies give congruous empirical support for the TOE framework. As can be seen from this Table 3-1, the particular factors, identified within the three contexts, vary across different studies. Furthermore, Chau and Tam (1997); Kuan and Chau (2001); and Zhu et al. (2003) suggested that the TOE framework ought to be considered as a theoretical basis for the adoption of IT since it was found to be a useful starting point in understanding the adoption of technological

innovation. Cahill et al. (1990) revealed that the unique combination of this framework provided greater explanatory power for the successful use of IT in different organisations.

In summary, in relation to the adoption of the technology, the effect and significance of the TOE framework vary depending on the state of the company, its external environment; and the type of technology which is adopted. As shown in Table 3-1, the TOE framework was utilized in studying the different types of technology which were adopted. In addition having regard to the literature review on the adoption of technology, most researchers (i.e.,Zhu et al., 2003) stated that the TOE framework was a suitable theory for investigating the SMEs' adoption of technology. This shows that the TOE framework is suitable in studying the adoption of B2B e-commerce. The solid theoretical base and the reliable empirical results support the argument that the TOE framework can be used in studying, in both developed (USA) and developing (Egypt) countries, the manufacturing SMEs' adoption of B2B e-commerce.

3.5 Hypotheses and conceptual framework

This section presents the hypotheses used to determine the relationship between the variables and the research conceptual framework. The conceptual framework (Figure 3-1) and hypotheses were developed based on the literature review and the technology- organisation-environment (TOE) framework (Tornatzky and Fleischer, 1990).

3.5.1 Research hypotheses

3.5.1.1. The relationship between technological factors and levels of B2B e-commerce adoption

The technological factors indicate the attributes of the technology to be adopted (Henderson et al., 2012). Rogers (1983) suggested that innovation has five features which might affect the adoption. Namely, these were trialability; observability; relative advantage; complexity; and compatibility. However, Kuan and Chau (2001) found that complexity, compatibility and relative advantage were consistently significant in explaining the adoption of IT. Accordingly, in this research, the researcher considered relative advantage, compatibility, and complexity to be the key factors in the technological context (see section 2.10).

Relative advantage

Relative advantage refers to the benefits which can be provided to a company through adopting tecnology (Rogers, 1995). Cho and Kim (2002) suggested that, in making the decision to adopt a new technology, the primary criteria were based generally on the transition costs to the new technology and the benefits from its introduction.

Additionally, the literature review of factors affectingthe SMEs adoption of IT showed that relative advantage was the most significant factor in adopting IT (i.e.,Khemthong and Robert, 2006, Al-Qirim, 2007). In many studies relating to the adoption of e-commerce, it was shown that relative advantage had a positive impact on the

adoption of e-commerce (Premkumar et al., 1994, Chwelos et al., 2001, Rogers, 2003, Chen et al., 2005, Ching and Ellis, 2004, Hassan et al., 2010).

Compatibility

Compatibility refers to the degree to which the B2B e-commerce technology is compatible with the organisation`s existing procedures and experience (Rogers, 1995). Cho and Kim (2002) suggested that adopting new technology demanded changes to the existing procedures and skills. Additionally, Kwon and Zmud (1987) and Chung and Synder (2000) found that the incompatibility of new technology with existing values and work practices inhibited the adoption of a new innovation.

Grandon and Pearson (2004) and Zhu et al. (2006) found that, compared to the other features of innovation, compatibility was the strongest driver of the adoption of technology . It was found that compatibility had a positive effect on the adoption of e-commerce (i.e., Mirchandani and Motwani, 2001, MacGregor and Vrazalic, 2005). Teo et al. (1998) suggested that the high compatibility the less adjustment or change will be needed and the low level of resistance to the technology when it is adopted.

Complexity

Complexity refers to the degree to which B2B e-commerce technology is perceived to be difficult to understand, learn and use. Rogers (1995) suggested that the diffusion of adoption is quicker for thoughts which are understood readily and easy to understand than for those which need new skills and understanding. Cho and Kim

(2002) found that difficulties in understanding and applying a new technology might lead to resistance; slower recognition of its value; and fear of failure.

According to Grandon and Pearson's (2004) study, the SMEs' CEOs perceived complexity as significant factor in the adoption of e-commerce. In addition, through their work, Khemthong and Robert (2006) and Al-Qirim (2007) found that complexity was an important factor in the adoption of e-commerce. Furthermore, previous studies showed that complexity had a negative effect on the adoption of e-commerce (Tornatzky and Fleischer, 1990, Cooper and Zmud, 1990). Therefore, the following hypotheses can be made:

H1.Technological factors have an impact on level 1 of B2B e-commerce adoption.

H1a-Relative advantage has a positive impact on level 1 of B2B e-commerce adoption.

H1b-Compatibility has a positive impact on level 1 of B2B e-commerce adoption.

H1c-Complexity has a negative impact on level 1 of B2B e-commerce adoption.

H2.Technological factors have an impact on level 2 of B2B e-commerce adoption.

H2a-Relative advantage has a positive impact on level 2 of B2B e-commerce adoption.

H2b-Compatibility has a positive impact on level 2 of B2B e-commerce adoption.

H2c-Complexity has a negative impact on level 2 of B2B e-commerce adoption.

H3.Technological factors have an impact on level 3 of B2B e-commerce adoption.

H3a-Relative advantage has a positive impact on level 3 of B2B e-commerce adoption.

H3b-Compatibility has a positive impact on level 3 of B2B e-commerce adoption.

H3c-Complexity has a negative impact on level 3 of B2B e-commerce adoption.

H4. Technological factors have an impact on level 4 of B2B e-commerce adoption.

H4a-Relative advantage has a positive impact on level 4 of B2B e-commerce adoption.

H4b-Compatibility has a positive impact on level 4 of B2B e-commerce adoption.

H4c-Complexity has a negative impact on level 4 of B2B e-commerce adoption.

3.5.1.2 The relationship between organisational factors and levels of B2B e-commerce adoption

Organisational factors refer to the firm's characteristics which may influence the adoption and implementation of e-commerce (Doolin and Troshani, 2007). In addition, Kuan and Chau (2001) suggested that organisational factors' influence on the adoption of e-commerce related mainly to perceived organisational resources. The organisational factors, identified widely in the literature review, included top management support and firm size. Accordingly, in this research, the researcher considered that top management support and firm size to be the key factors in the organisational context (see section 2.10).

Top management support

Top management support can be defined as the extent of commitment and resource support given by the top management for the adoption of e-commerce (Premkumar, 2003). Top management is the SME's decision maker and, therefore, it is important to ensure that there is a commitment to resourcing the implementation of e-commerce (Grover and Goslar, 1993) and to overcoming the resistance and barriers to the adoption of e-commerce (Teo et al., 1998).

Furthermore, Sabherwal et al. (2006) and Jeyaraj et al. (2006) suggested that within companies, the successful adoption of e-commerce have was related to the support of top management. Moreover, previous studies found that top management support had a positive effect on the adoption of e-commerce (i.e.,Meyer and Goes, 1988, Teo et al., 2009).

Firm size

Firm size is a commonly mentioned factor in the literature about the adoption of e-commerce (i.e.,Wang and Lin, 2009, Al-Bakri et al., 2010). Rogers (1995) suggested that, for e-commerce diffusion, firm size was a significant organisational characteristic. Furthermore, based on the impact of firm size on the adoption of e-commerce, the previous studies presented mixed results. For example, Levenburg et al. (2005) and Wymer and Regan (2005) found that firm size has impact on the IT adoption (e.g. Internet, e-commerce, B2B e-commerce).

Based on data collected from 3103 firms, Zhu et al. (2003) found that larger firms were more expected to make dedicated investments in e-business. It was found that the organisation's size was a reliable predictor of the adoption of IT (Chuang et al., 2007, Wang and Lin, 2009). On the contrary, studies, such as Scupola (2009), Seyal and Rahman (2003) and Jean et al. (2006) found that firm size did not play an important role in the adoption of e-commerce. This study included this factor in order to investigate its effect on SMEs' adoption of B2B e-commerce. This discussion leads to the following hypotheses:

H5.Organisational factors have a positive impact on level 1 of B2B commerce adoption.

H5a-Top management support has a positive impact on level 1 of B2B e-commerce adoption.

H5b-Firm size has a positive impact on level 1 of B2B e-commerce adoption.

H6.Organisational factors have a positive impact on level 2 of B2B e-commerce adoption.

H6a-Top management support has a positive impact on level 2 of B2B e-commerce adoption.

H6b-Firm size has a positive impact on level 2 of B2B e-commerce adoption.

H7.Organisational factors have a positive impact on level 3 of B2B e-commerce adoption.

H7a-Top management support has a positive impact on level 3 of B2B e-commerce adoption.

H7b-Firm size has a positive impact on level 3 of B2Be-commerce adoption.

H8.Organisational factors have a positive impact on level 4 of B2B e-commerce adoption.

H8a-Top management support has a positive impact on level 4 of B2B e-commerce adoption.

H8b-Firm size has a positive impact on level 4 of B2B e-commerce adoption.

3.5.1.3 The relationship between environmental factors and levels of B2B e-commerce adoption

Environmental factors are external factors which either may impact on the adoption of B2B ecommerce or it is arena in which a company conducts its business. Scupola (2003) and Jean et al. (2006) considered environmental factors to be some of the factors which are more likely to affect the adoption of IT and which have a significant role in ensuring a successful adoption. This is because the organisations are open system and are affected by their external environment. In the literature review, environmental factors related extensively to competitive pressure; business partner pressure; and government support (see section 2.10). Therefore, in the environmental context, the three factors of competitive pressure, business partner pressure and government support are expected to affect the adoption of B2B e-commerce.

Competitive pressure

Competitive pressure is defined as the degree of pressure which the organisation senses from industry competitors (Zhu and Kraemer, 2005). Kuan and Chau (2001) and Premkumar and Roberts (1999) indicated the higher the competitive intensity in an industry, the greater pressure is as a motivator for the adoption of e-commerce. Moreover, competitive pressure is considered as an important factor and to have a positive effect on the adoption of e-commerce (i.e.,Grandon and Pearson, 2004, Wymer and Regan, 2005). Thong (1999) suggested that, in a more competitive

environment, a small business needs to adopt IT in order to get a huge competitive advantage.

Business partner pressure

Pressure from a business partner is another critical factor in SMEs' adopting B2B e-commerce. Small businesses are sensitive towards pressure from trading partners since they are more likely to be dependent economically on their trading partners for survival. Business partner pressure is expected to have a positive effect on the adoption of B2B e-commerce (i.e.,Min and Galle, 1999, Keeling et al., 2000, Kraemer et al., 2002). A business partner can be both a supplier and a buyer. Min and Galle (1999) found that buyers, who used e-commerce greatly, were more likely to affect their suppliers to adopt e-commerce. Keeling et al. (2000) investigated the factors which affected SMEs' adopting e-commerce and found that the process of adoption was affected and driven by pressure from competitors and customers themselves, and a belief that e-commerce would avail them of benefits.

Kraemer et al. (2002) indicated that the pressure from business partners for e-commerce could be formed by customer service and support; an integration of the same business processes with suppliers or other business partners; and an exchange of operational date with suppliers or with business customers. Also, it is quit logical to take the necessary steps to adopt technologies which can attract more business from existing customers and maintain their loyalty through adopting e-commerce (Al-Qirim, 2007).

Government support

Government support can facilitate the adoption of B2B e-commerce through tax law; utilizing supportive business; and regulating the Internet to make it a trustworthy business platform. Previous studies such as Kuan and Chau (2001); Chang and Cheung (2001); Grandon and Pearason (2004); Wymer and Regan (2005) found a positive relationship between government support and the adoption of e-commerce. The government can influence and support the adoption of IT adoption through laws,regulation and investment in the infrastructure. Oxley and Yeung (2001) and Zhu and Thatcher (2007) stated that the government had an important part since it created an institutional environment which encouraged private investment. Also, Shore (2001) mentioned that government support for the adoption of IT can be presented through national initiatives for training and maintaining a suitable IT workforce.

Gibbs et al. (2003) cited that e-commerce was affected greatly by government incentives and national policies, like trade and telecommunication liberalisation, and, also, by government promotions. Zhu and Thatcher's (2007) study indicated that governmental encouragements represented the most powerful facilitators at the beginning of the adoption of B2B e-commerce. In addition, Kuan and Chau (2001); Chang and Cheung (2001); Grandon and Pearson (2004) and Wymer and Regan (2005) found that the government support factor was significant in the IT adoption (e.g. EDI, Internet, e-commerce). Therefore, it is expected that government support has a positive effect on B2B e-commerce. This discussion leads to the following hypotheses:

H9.Environmental factors have a positive impact on level 1 of B2B e-commerce adoption.

H9a-Competitive pressure has a positive impact on level 1 of B2B e-commerce adoption.

H9b-Business partner pressure has a positive impact on level 1 of B2B e-commerce adoption.

H9c-Government support has a positive impact on level 1 of B2B e-commerce adoption.

H10.Environmental factors have a positive impact on level 2 of B2B e-commerce adoption.

H10a-Competitive pressure has a positive impact on level 2 of B2B e-commerce adoption.

H10b-Business partner pressure has a positive impact on level 2 of B2B e-commerce adoption.

H10c-Government support has a positive impact on level 2 of B2B e-commerce adoption.

H11.Environmental factors have a positive impact on level 3 of B2B e-commerce adoption.

H11a-Competitive pressure has a positive impact on level 3 of B2B e-commerce adoption.

H11b-Business partner pressure has a positive impact on level 3 of B2B e-commerce adoption.

H11c-Government support has a positive impact on level 3 of B2B e- commerce adoption.

H12.Environmental factors have a positive impact on level 4 of B2B e-commerce adoption.

H12a-Competitive pressure has a positive impact on level 4 of B2B e-commerce adoption.

H12b-Business partner pressure has a positive impact on level 4 of B2B e-commerce adoption.

H12c-Government support has a positive impact on level 4 of B2B e- commerce adoption.

H13.Each level of B2B e-commerce adoption is affected by different factors from another level of adoption.

H14.There is a significant difference between the factors that affect manufacturing SMEs` adoption of B2B e-commerce in USA and the Egypt.

3.5.1.4 Level of adoption of B2B e-commerce

The mediator variable is the level of adoption of B2B e-commerce which include four levels based on Lefebvre et al.'s (2005) study of the adoption levels of B2B e-commerce. Using the mediator variable, each of the four levels is included in the next one; consequently, all three levels are a part of level 4. In addition, previous studies such as (Love et al., 2001, Drew, 2003, Lefebvre et al., 2005, Elia et al., 2007) showed that most SMEs were still very primitive in using B2B e-commerce. Furthermore, Claycomb (2005) and Aggestam and Soderstrom (2005) found that, possibly compared to the small ones, the large firms had greater levels of adopting B2B e-commerce. However, in their study, Bigne-Alcaniz et al. (2009) found that SMEs used

B2B e-commerce the most. Similarly, Dean et al. (2012) reported that American SMEs integrated the Internet and related technology extensively into their businesses and the USA leads the world in B2B e-commerce.

For developing countries and compared to their peers in developed countries (Suryani and Subagyo, 2011, Alam et al., 2011, Abou-Shouk et al., 2012), most SMEs remained very slow adopters of e-commerce. Recent studies found that, in developing countries, SMEs had adopted only basic applications of e-commerce (i.e.,Abou-Shouk et al., 2012, Zaied, 2012). This discussion leads to the following hypothesis:

H15. In developed countries; the manufacturing SMEs adopt higher level of B2B e-commerce than SMEs in developing countries.

3.5.1.5 The relationship between levels of B2B e-commerce adoption and competitive advantage

It is widely accepted that IT plays a significant role in creating and sustaining a competitive advantage (i.e.,Porter, 1985, Wiseman, 1985, Parsons, 1993, Porter, 2005). Researchers maintained that IT (e.g. B2B e-commerce) provided organisations with competitive advantage through various routes. These included: cost reduction; differentiation; growth; and quality (see section 2.12).

Cost reduction

Cost reduction is defined as `the achievement of real and permanent reduction in the unit cost of goods manufactured or services` (Mishra, 2009). One of the prime and

tangible benefits from implementing B2B e-commerce is cost reduction (Awad, 2002, Straub et al., 2002, Standing and Lin, 2007, Kraemer et al., 2002).

Krell and Matook (2009) found that the adoption of e-commerce helped companies to reduce the communication costs with business partners (e.g., fax, mail, and phone costs, etc.) and operating costs. In addition, reducing inventory costs are another example for cost reduction; this is achieved by adoption of e-commerce (Lumpkin et al., 2002). Additionally, it was found that adopting internet technologies reduced the costs of marketing, advertising and sales of products/services (Teo and Pian, 2003, Porter, 2005).

Similarly, N'Da et al. (2008) showed that customer support costs could be reduced by adopting B2B e-commerce. As revealed by Lederer et al. (1997), reduction of travel costs were another type of cost reduction due to the adoption of technology. Moreover, Teo and Pian (2003) found that, through the adoption of IT, SMEs could reduce their document processing costs (e.g., the costs of document storage and manipulation amongst other costs) and document publication costs (e.g., the costs of publishing catalogues and brochures).

Differentiation

Differentiation can be defined as the result of efforts to create goods, service or a brand which, in comparison to its rivals, stands out as a giver of unique value to clients (Bannock, 2003). It was found that Internet adoption enhance the credibility and prestige of the organisation and providing new products/services to customers

(Teo and Pian, 2003). In addition, Lumpkin et al. (2002) found that the adoption of e-commerce increased the customers' opportunities to customize products and services. According to Lederer et al. (1997), the adoption of technology helps companies to speed up transactions and provides customers with easier access to information. Moreover, N`Da et al. (2008) found that enhancing brand distinguishability was achieved by adopting B2B e-commerce.

Growth

Growth is the next dimension of competitive advantage which can result from the adoption of technology. In the extant literature, this is used commonly to represent competitive advantage. There are many facets of growth. Teo and Pian (2003) explained that growth meant the enhancement of business efficiency. It could mean also increasing the organisation's market share (N`Da et al., 2008); increasing the organisation's sales and revenues (Bhatt et al., 2010); or increasing customer satisfaction (Teo and Pian, 2003).

The adoption of e-commerce enables an organisation to expand its market and share of customers and, therefore, facilitating an organisation's growth strategy (McGaughey, 2002, Vatanasakdakul et al., 2004). Adopting the Internet has an effect on an organisation's growth ability by intensifying its scope and extending its core business through either market penetration and development or product development (Fruhling and Digman, 2000). Based on internet technology, an organisation could achieve a rapid and effective expansion to its geographical markets both regionally and globally.

Furthermore, the presence of the Internet opens new markets and more distribution channels. In addition, a website, which is rich with information, enables an organisation to form and develop a connection with customers. This is achieved by introducing more effective marketing; new channels and shorter time to market; customised or personalised products; online 24-hour technical support; and an online interactive community. This connection increases sales and opportunities to provide new products and services (Fruhling and Digman, 2000, Porter, 2001).

Moreover, some studies, such as (Brookes and Wahhaj, 2001, McGaughey, 2002, Standifera and Wall, 2003, Melville et al., 2004, Subramani, 2004, Humphreys et al., 2006, Al-Bakri et al., 2010) found that, through adopting and using these technologies which help to facilitate and improve their processes, B2B e-commerce influenced the company`s efficiency. Also, the adoption of B2B e-commerce helps firms to increase sales and revenues (Bhatt et al., 2010) and customer satisfaction (Teo and Pian, 2003).

Quality

As perceived by the clients, quality is defined as the degree of superiority of the service or the product when compared to a competitor`s product or service (N`Da et al., 2008). In the existing literature, quality is one of the most commonly used dimensions to measure competitive advantage.

The use of B2B e-commerce can help firms to make improvements to the quality of service and product (Subramani, 2004, Standing and Lin, 2007, N`Da et al., 2008). In

addition, the adoption of e-commerce provides better, cheaper, faster and more accurate information (Moodley, 2003). Furthermore, Lai et al. (2006) claimed that the fast delivery of products and services was a form of quality which was achieved by adopting IT. Through their study, they found, that the adoption of IT reduced transaction errors.

Additionally, N`Da et al. (2008) found that the adoption of B2B e-commerce enhanced the quality of relationships with business partners and quality of customer service (e.g., quick responses to customer enquiries, promptly following up customer claims and complaints). These lead to the following hypotheses:

H16.The first level of B2B e-commerce adoption affects an SME's competitive advantage.

H16a- The first level of B2B e-commerce adoption affects cost reduction.

H16b- The first level of B2B e-commerce adoption affects differentiation.

H16c- The first level of B2B e-commerce adoption affects growth.

H16d -The first level of B2B e-commerce adoption affects quality.

H17. The second level of B2B e-commerce adoption increases an SME's competitive advantage.

H17a- The second level of B2B e-commerce adoption increases cost reduction.

H17b- The second level of B2B e-commerce adoption increases differentiation.

H17c- The second level of B2B e-commerce adoption increases growth.

H17d- The second level of B2B e-commerce adoption improves quality.

H18.The third level of B2B e-commerce adoption enhances an SME's competitive advantage.

H18a -The third level of B2B e-commerce adoption increases cost reduction.

H18b- The third level of B2B e-commerce adoption increases differentiation.

H18c -The third level of B2B e-commerce adoption increases growth.

H18d- The third level of B2B e-commerce adoption improves quality.

H19.The fourth level of B2B e-commerce adoption improves an SME's competitive advantage.

H19a- The fourth level of B2B e-commerce adoption increases cost reduction.

H19b- The fourth level of B2B e-commerce adoption increases differentiation.

H19c- The fourth level of B2B e-commerce adoption increases growth.

H19d- The fourth level of B2B e-commerce adoption improves quality.

H20. The higher the level of B2B e-commerce an SME adopts, the higher will be the level of competitive advantage which it gains (i.e., cost reduction; differentiation; growth; and quality).

Finally, we test a hypothesis comparing the effects in Egypt and the USA:

H21. There are significant differences between the effects of different levels of B2B e-commerce adoption on competitive advantage in Egypt and the USA.

In addition to the direct relationships between the constructs, there are indirect relationships between technological factors, organisational factors and environmental factors with competitive advantage via the levels of B2B e-commerce adoption as proposed in Figure 3-1. The following hypotheses are made:

H22. Technological factors affect the competitive advantage via the mediation of the different levels of B2B e-commerce adoption.

H23. Organisational factors affect the competitive advantage via the mediation of the different levels of B2B e-commerce adoption.

H24. Environmental factors affect the competitive advantage via the mediation of the different levels of B2B e-commerce adoption.

H25. There are significant differences between the effects of technological factors on competitive advantage in Egypt and in the USA via the mediation of the different levels of B2B e-commerce adoption.

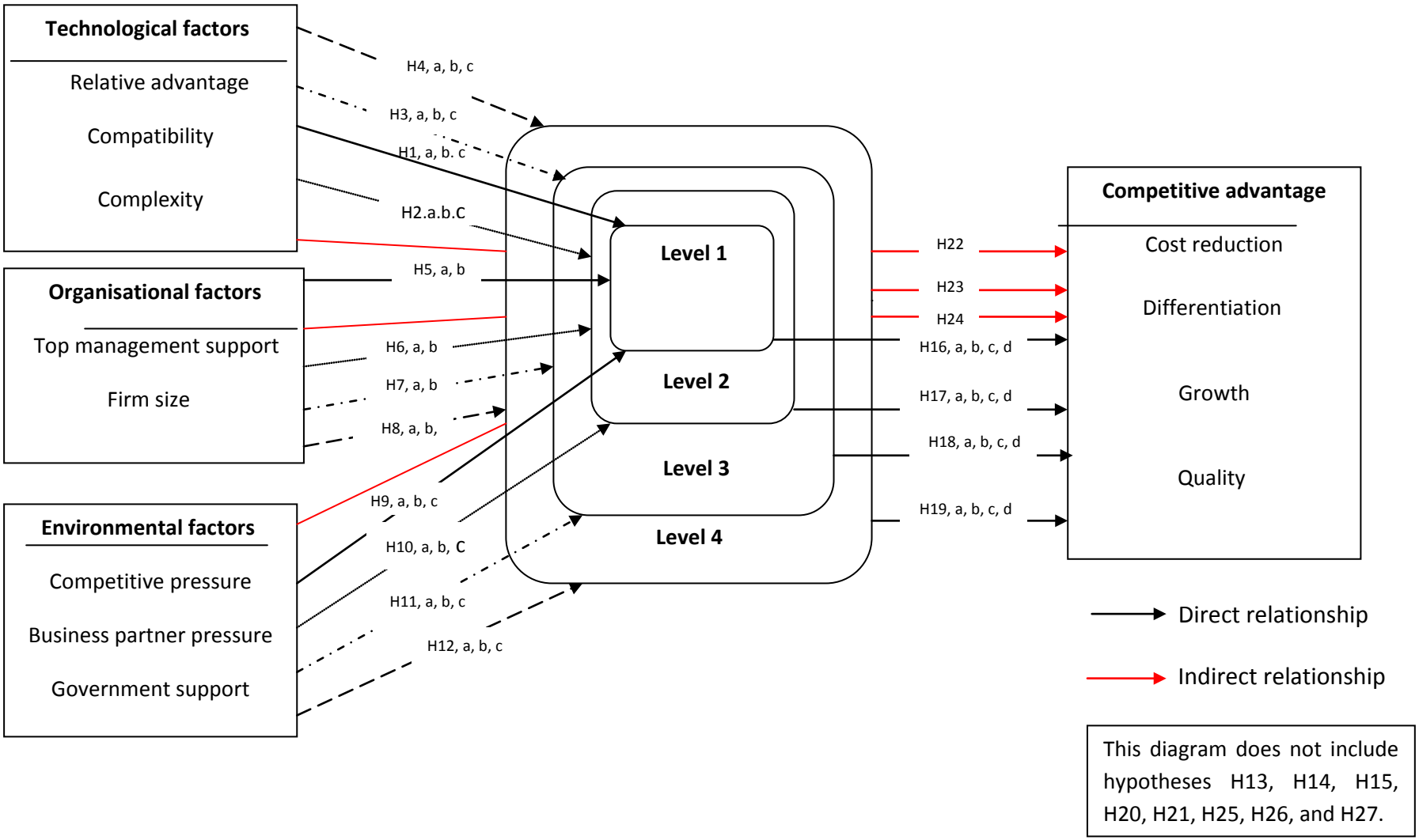
H26. There are significant differences between the effects of organisational factors on competitive advantage in Egypt and in the USA via the mediation of the different levels of B2B e-commerce adoption.

H27. There are significant differences between the effects of environmental factors on competitive advantage in Egypt and in the USA via the mediation of the different levels of B2B e-commerce adoption.

3.5.2 Research conceptual framework

This study developed a conceptual framework (Figure 3-1) and hypotheses based on the literature review and the technology- organisation-environment (TOE) framework (Tornatzky and Fleischer, 1990). .

Figure 3 –1: The conceptual framework



The objective is to investigate the level of B2B e-commerce adoption amongst manufacturing SMEs in developed (USA) and developing countries (Egypt), and how the different levels of B2B e-commerce adoption affect the creation of a competitive advantage in these enterprises. The study investigated, also, how the technology-organisation-environment factors affect the different levels of adoption of B2B e-commerce. To do so, the study tests the 27 main hypotheses in both developed and developing economies.

3.6 Summary

It is essential for companies moving to the B2B e-commerce to assess all features of their technological, organisational, and environmental contexts since they need to detect elements which will determine successful conversion. The literature on firms' adoption of B2B e-commerce indicated that most studies were based on one of the following frameworks: technology acceptance model (TAM); innovation diffusion theory (IDT); Resource-based theory; and technology-organisation-environment frameworks (TOE). These theories have dissimilar applications and are aimed at studying different features of the business e-commerce adoption. Some theories, such as TAM and IDT, examine only technological features. On the other hand, the technology-organisation-environment (TOE) framework, tries to examine effects of technology factors, organisational factors and environment factors on IT adoption. Since the SMEs have unique characteristics, this study needed a comprehensive Theory to study adoption of B2B e-commerce such as the TOE framework, and to build its conceptual model. This study tests 27 hypotheses regarding the causal effects between the constructs.

Chapter 4: Methodology and research design

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4.8 Summary

4.1 Introduction

The research methodology is a group of structured guidelines or activities for the sake of generating valid and reliable research findings or results (Mingers, 2001). This chapter presents this study's research philosophy; research approach; and research methods. It explains the ideas behind the quantitative method, namely, the questionnaire surveys. Also, it introduces, in detail, how the quantitative data collection tool is designed and measured. Besides, this chapter deals with the issues regarding the sampling frame and sample size of the study. In addition, this chapter give details about the reliability and validity of study questionnaire.

4.2 Research philosophy

Creswell (2013) identified four research philosophies are: participatory, social constructivism, pragmatism and positivism. Although the advocacy/participatory philosophy can perform, also, as a basis for quantitative research, it influences the qualitative research. Using this philosophy, the research comprises an action agenda which may assist in changing the lives of the organisations and the members working within them. Often, advocacy/participatory research studies begin with a significant stance or topic about problems in society. In addition, the participatory research's aim is to create discussion and political debate and, consequently, change will happen (Creswell, 2003).

Social constructivism is the second philosophy; this is used generally within a qualitative studies. With regard to this philosophy, individuals attempt to

understand the world in which they live and work. The qualitative study uses open-ended questions to enable the respondents to share their opinions and to build meaning to a situation.

Pragmatism is the third philosophy; it is applied to mixed methods research which embraces qualitative and quantitative methods. This philosophy concentrates on the research problem instead of the techniques used to understand the problem research, under this philosophy; the researcher engages different methods and techniques to understand best the study problem.

Positivism is the fourth philosophy. In the nineteenth- century, Auguste Comte (1798-1857) and Saint-Simon (1760-1825) originated and used the word ` Positivism` to describe a philosophical position. Both social sciences and information science refer to positivism as a form of empiricism, positivism believes that the data can be collected in the social environment and includes a reaction to it (May, 1997). Schiffman and Kanuk (1997) mentioned principal positivist methods; these include observations, experiments and survey techniques, and contain even complex statistical analysis in order to obtain the findings and to test the hypotheses empirically. In addition, positivism embodies certain assumptions about truth and reality (VanderStoep and Johnston, 2009) and is relevant to the question regarding the relative values of scientific versus humanistic approaches (Hjorland, 2005, Aldhmour, 2007).

Positivism affords a theoretical focus for the research and opportunity to control the research process and supports the emphasis on quantitative data (Bryman, 2001, Kincaid, 1998). VanderStoep and Johnston (2009) cited that, historically, the quantitative methods were associated with positivism. Furthermore, the positivistic research's basic goal is to generalise the result to the larger population, known as ` the deductive approach`. In order to clarify the positivism, the deductive approach intimates that, firstly, the theory should be generated and, then, tested through empirical observation. When it is falsified, the theory must be rejected and, then, a new one prepared to replace it (Limpanitgul, 2009). This study employs the positivism philosophy with deductive and quantitative methods in order to understand fully on the one hand the factors affecting the adoption levels of B2B e-commerce and on the other hand; to what extent the adoption levels affect the manufacturing SMEs' competitive advantage.

4.3 Research approach

Lewis and Thornhill (2006) distinguished between inductive and deductive approaches. The inductive approach means 'the process of inferring a general law or principle from observation of particular instances' (Rothchild, 2006, P.2). The researcher conducts series of observations or interviews in order to gather qualitative data and, then, analyses them to identify the nature of the problem. The output of analyzing the collected data is used to structure a theory. This approach is concerned with why something is happening. However, the deductive approach is said to be concerned with describing what is happening (Saunders et al., 2009).

The deductive approach means 'the inference by reasoning from generals to particulars' (Rothchild, 2006, P.3). The deductive approach develops and tests the theories or hypotheses through empirical observation (Crowther and Lancaster, 2008). Bryman and Bell (2007) classifed the process of the deductive approach into 6 steps. These are, namely, theory; hypothesis; collecting data; findings; confirming or rejecting hypotheses; and revising the theory.

In using hypotheses to explian the relationships between the variables, the deductive approach owns some significant features. In testing these hypothesises, another characteristic is utilised, the gathering of quantitative data. Thirdly, the requisite conceptions are operationalised in a way which assists the facts to be measured quantitatively. Generalisation is the deductive approach's final characteristic (Saunders et al., 2009).

It is valuable to accord the research approach to the research philosophy. Then, the selected research approach assists the scholars to choose the research design, namely, the methods for gathering data and the processes of analysis. Besides, the selected research approach helps the researcher to choose the suitable research strategy and technique (Williams, 2007, Saunders et al., 2009). The deductive approach is indebted to positivism (Saunders et al., 2009). Therefore, based on positivism and the deductive approach; this thesis use the quantitative method.

4.4 Research method

There are three research methods, which can be used in social science study, are: qualitative; quantitative; and mixed methods(Creswell, 2003). The qualitative method is associated with the constructivist or advocacy research philosophies and, normally, uses the inductive approach. Additionally, in the qualitative method, the interview techniques and/or data analysis procedures, such as the non-numerical analysis, use this method to collect data (Saunders et al., 2009). On the contrary, quantitative method relates commonly to the positivism philosophy and uses mostly the deductive approach.

Furthermore, the quantitative method is used generally to denote the data analysis procedures such as statistics or certain data collection techniques such as questionnaires. Mixed methods comprise both qualitative and quantitative methods. Employing mixed methods, the researcher can use a variety techniques (e.g. interviews and questionnaire) to collect the data. This study used the quantitative method along with questionnaire surveys. The following sections describe the questionnaire surveys.

4.5 Questionnaire surveys

In business research, the questionnaire survey is the most commonly-used data collection tool. The survey method is connected to the deductive approach and positivism philosophy (Saunders et al., 2009). It is the systematic collection of data from respondents for the purpose of knowing and / or predicting some aspect of

behaviour of the sample of interest (Tull and Hawkins, 2003). Similarly, de Vaus (1995) defined a questionnaire survey as a form of inquiry which included gathering and organising information systematically and analysing the results statistically.

Furthermore, survey research is used to answer who, what, where, how much and how many questions. Therefore, it is used in both exploratory and descriptive research (Saunders et al., 2009). Wiersma (1991) cited that survey research, which deals with studies on how people behave, feel, perceive and the object, is to determine how these variables are related.

Besides, survey research includes the information which is obtained by questioning the participants directly (Zain, 1995). Dane (1988) suggested that the researchers collect the data which relate to the variables and, based on the collected data, they examine the relationship between the variables based on the responses presented at the time the question is asked.

4. 5.1 Questionnaire design

The questionnaire design varies according to how it is administered; in other words, the researcher's way of contacting the respondents the two main type administration methods are interviewer-administered and self-administered. When using the interviewer-administered questionnaire, the researcher records the responses.

In addition, the interviewer-administered questionnaire includes two categories: the phone questionnaire (the researcher contacts the respondents and completes the questionnaires by telephone) or structured interviews which are sometimes called, also, 'interview schedules' (The researcher physically sees the respondent and asks questions face-to-face) (Saunders et al., 2009). For the self-administered questionnaire, the respondent completes it. Such questionnaires are administered electronically using e-survey, delivered by hand to each respondent, then collected later, hard copy with a cover letter, sent and received by post.

This study used an e-survey to collect data from the American SMEs, whilst, following the failure, probably due to cultural concerns, of an attempt to do so via an e-survey only, a hand-delivered and e-survey was used to collect data from Egyptian SMEs. The instructions included with the questionnaire stated that it ought to be completed by the owner-manager of the business.

According to structure, the questions can take usually two forms: closed; and open-questions. Closed questions are called sometimes forced-choice questions (deVaus, 2002) or closed-ended questions (Dillman, 2000). Closed questions provide a number of alternative responses and ask the respondent to choose from these responses. Additionally, a closed question needs commonly minimal writing since they are easier and quicker to fill. Open questions (Saunders et al., 2009) or sometime referred to as open-ended questions (Dillman, 2000) give respondents the chance to answer the questions in their own way (Fink, 2003) by writing a number of words or

sentences. Also, it can help the interviewers to collect new data or issues around the studied topic about which they had not asked.

The researcher uses mostly a questionnaire which comprises a mixture of closed and open questions (Saunders et al., 2009). Accordingly, this study used a mixture of closed and open questions to permit the respondents to select the relevant answers and, also if they desired, to add further information representing their views.

Furthermore, the questionnaire could include four types of information: opinions beliefs/attitudes; knowledge; behaviour and attributes. The first type of information relates to people's feelings, ideas, thoughts, perceptions or judgments. Knowledge information is around what the respondents know. The third one is related to what respondents have done or do or will do, in the past, present and future and if they have plan to do something. The last type of information is concerned with the respondent`s personal demographic characteristics such as gender, age, occupation, education, salary (Taylor-Powell, 1998). The questionnaire, designed this study, requested a combination of these types of information. Before moving on to the outline of the questionnaire, the following section discusses the measurement scale for the questionnaire.

4. 5.2 Survey measurement instrument

The main latent variables of the study are the technological factors (relative advantage, compatibility and complexity), organisational factors (top management support and firm size), environmental factors (competitive pressure, business

partner pressure and government support), the levels of B2B e-commerce adoption and competitive advantage constructs (cost reduction, differentiation, growth, and quality) (see conceptual framework of the study in Chapter 3). This section starts by looking at the independent variables and then moves on to the mediator and dependent variables.

Regarding the factors affecting levels of adoption, the technological factors (relative advantage, compatibility and complexity), organisational factors (top management support, firm size) and environmental factors (competitive pressure, business partner pressure and government support), the study used established measures drawn from extant studies (see Table 4-1).

Table 4-1: Measurement scale for technological, organisational and environmental factors

Technological factors		References
Relative advantage	Using B2B e-commerce would enable my company to accomplish specific task more quickly (Relative1)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)
	Using B2B e-commerce would improve my job performance (Relative2)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)
	Using B2B e-commerce in my job would increase my productivity (Relative3)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)
	Using B2B e-commerce would enhance my effectiveness on the job (Relative4)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)
	Using B2B e-commerce would make it easier to do my job (Relative5)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)
	I would find B2B e-commerce useful in my job (Relative6)	(Moore and Benbasat, 1991, Thong, 1999, Grandon and Pearson, 2004)

Compatibility	Using a B2B e-commerce is compatible with all aspects of our work (Compati1) Using B2B e-commerce is consistent with our company`s culture (Compati2) Attitudes towards B2B e-commerce adoption in our company have been favourable (Compati3) B2B e-commerce adoption is compatible with our information technology infrastructure (Compati4) B2B e-commerce adoption is consistent with our business strategy (Compati5)	(Moore and Benbasat, 1991, Thong, 1999, Premkumar and Roberts, 1999, Grandon and Pearson, 2004) (Teo et al., 1998, Premkumar and Roberts, 1999, Teo and Pian, 2003, Ching and Ellis, 2004, Grandon and Pearson, 2004) (Rogers, 1995, Teo et al., 1998, Teo and Pian, 2003) (Rogers, 1995, Teo et al., 1998, Teo and Pian, 2003, Bradford and Florin, 2003, Ching and Ellis, 2004) (Rogers, 1995, Teo et al., 1998, Teo and Pian, 2003)
complexity	The skills required to use B2B e-commerce are too complex for our employees (Complex1) Integrating these technologies in our current work practices will be very difficult (Complex2) I believe that B2B e-commerce is cumbersome to use(Complex3) Using B2B e-commerce is often frustrating(Complex4)	(Moore and Benbasat, 1991, Premkumar and Roberts, 1999, Ching and Ellis, 2004) (Moore and Benbasat, 1991, Premkumar and Roberts, 1999, Ching and Ellis, 2004) (Moore and Benbasat, 1991, Thong, 1999) (Moore and Benbasat, 1991, Thong, 1999)
Organisational factors		**References**
Top management support	The owner/manager is interested in the adoption of the B2B e-commerce (Topm1) The owner/manager considers B2B e-commerce adoption is important to the company (Topm2) The owner/manager has effectively communicated its support for B2B e-commerce adoption (Topm3) The owner/manager has allocated adequate resources to adoption of B2B e-commerce (Topm4) The owner/manager actively encourages employees to use the new technologies in their daily tasks (Topm5) The owner/manager is committed to the use of the B2B e-commerce (Topm6) The owner/manager desires to project the company as a leader in the use of new technologies (Topm7)	(Grover and Goslar, 1993, Teo and Ranganathan, 2004, Teo et al., 2009, Teo and Pian, 2003, Teo et al., 1998) (Grover and Goslar, 1993, Teo and Ranganathan, 2004, Teo et al., 2009, Teo and Pian, 2003, Teo et al., 1998) (Grover and Goslar, 1993, Teo and Ranganathan, 2004, Teo et al., 2009, Teo and Pian, 2003, Teo et al., 1998, Premkumar and Roberts, 1999, Bradford and Florin, 2003) (Premkumar and Roberts, 1999, Bradford and Florin, 2003) (Premkumar and Roberts, 1999) (Grover and Goslar, 1993, Teo and Ranganathan, 2004, Teo et al., 2009, Teo and Pian, 2003, Teo et al., 1998) (Premkumar and Roberts, 1999)
Firm size	Number of employees	(Premkumar and Roberts, 1999, Thong, 1999, Zhu et al., 2006, Buonanno et al., 2005, Teo et al., 2009)
Environmental factors		**References**
Competitive pressure	We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce (Competitivep1) We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace (Competitivep2) Our competitors in market drive our company to use B2B e-commerce (Competitivep3)	(Premkumar and Roberts, 1999, Ching and Ellis, 2004) (Premkumar and Roberts, 1999, Ching and Ellis, 2004, Looi, 2005) (Thong, 1999, Zhu et al., 2003, Bradford and Florin, 2003, Zhu et al., 2006)

partner	Our suppliers demand us to useB2B e-commerce for doing business with them (partnerp1) Our customers demand us to useB2B e-commerce for doing business with them (partnerp2) Our suppliers are using B2B e-commerce (partnerp3) Our customers are using B2B e-commerce (partnerp4)	(Premkumar and Roberts, 1999, Ching and Ellis, 2004, Teo et al., 2009) (Premkumar and Roberts, 1999, Ching and Ellis, 2004, Teo et al., 2009) (Teo et al., 1998, Looi, 2005) (Teo et al., 1998, Looi, 2005)
Government support	The government plays an important role in promoting B2B e-commerce in SMEs(Governme1) The government provides incentives to using B2B e-commerce in SMEs (Governme2) Business laws support electronic business (Governme3) The government is helping in giving all kinds of assistance to help small business to use B2B e-commerce(Governme4) The government often informs us about the good points of B2B e-commerce (Governme5) Support from government is important to encourage us to use more of the B2B e-commerce in business(Governme6)	(Toh and Low, 1993, Teo et al., 1998) (Toh and Low, 1993, Teo et al., 1998, Zhu et al., 2006) (Zhu and Kraemer, 2005, Zhu et al., 2006) (Toh and Low, 1993, Teo et al., 1998, Tan and Teo, 2000, Looi, 2005) (Toh and Low, 1993, Tan and Teo, 2000, Looi, 2005) (Toh and Low, 1993, Tan and Teo, 2000, Looi, 2005)

The levels of B2B e-commerce adoption were measured using the classification of eBPs provided by Lefebvre et al. (2005) and discussed earlier in the literature review chapter (see section 2.11). This includes four levels of adoption, namely electronic information search and creation, simple electronic transactions, complex electronic transactions, and electronic collaboration, measured by 36 eBPs. For the competitive advantage constructs (cost reduction, differentiation, growth, and quality), the study used established measures drawn from extant studies, as shown in Table 4-2.

Table 4-2: Measurement scale for competitive advantage

	Competitive advantage	References
Cost reduction	Reducing costs of communication with business partners (CostR1)	(Lederer et al., 1997 , Teo and Pian, 2003, Krell and Matook, 2009)
	Reducing inventory costs (CostR2)	(Lumpkin et al., 2002, N`Da et al., 2008)
	Reducing operational costs (CostR3)	(Porter, 2005, N`Da et al., 2008, Krell and Matook, 2009)
	Reducing costs of marketing, advertisement and sale of products/ services (CostR4)	(Teo and Pian, 2003, Porter, 2005, N`Da et al., 2008)
	Reducing transaction costs (CostR5)	(N`Da et al., 2008)
	Reducing coordination costs (CostR6)	(N`Da et al., 2008)
	Reducing customer support costs (CostR7)	(N`Da et al., 2008)
	Reducing document processing costs (CostR8)	(N`Da et al., 2008)
	Reducing document publication costs (CostR9)	(Teo and Pian, 2003, N`Da et al., 2008)
Differentiation	Providing new products/services to customers (Diff1)	(Lederer et al., 1997 , Teo and Pian, 2003, N`Da et al., 2008)
	Providing better products/services to customers (Diff2)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Providing easier customer access to information (Diff3)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Speeding up transactions (Diff4)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Enhancing the credibility and prestige of the organisation (Diff5)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Increasing ability for customers to customize products and services (Diff6)	(Lumpkin et al., 2002, Teo and Pian, 2003)
	Enhancing brand distinguishability (Diff7)	(Teo and Pian, 2003, Porter, 2005, N`Da et al., 2008)
Growth	Enhancing business efficiency (Grow1)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Better achieve organisation goals (Grow2)	(Lederer et al., 1997 , Teo and Pian, 2003)
	Increasing market share (Grow3)	(Teo and Pian, 2003, N`Da et al., 2008)
	Increasing sales (Grow4)	(Teo and Pian, 2003, N`Da et al., 2008)
	Increasing revenue (Grow5)	(N`Da et al., 2008, Bhatt et al., 2010)
	Increasing customer satisfaction (Grow6)	(Teo and Pian, 2003)
	Entering new markets (Grow7)	(Teo and Pian, 2003, N`Da et al., 2008)
Quality	Increasing quality of customer service (Qual1)	(Porter, 2005, Lai et al., 2006, N`Da et al., 2008)
	Fast delivery (Qual2)	(Porter, 2005, Lai et al., 2006, N`Da et al., 2008)
	Increasing products /services quality (Qual3)	(Porter, 2005, N`Da et al., 2008)
	Increasing information quality (Qual4)	(Porter, 2005, N`Da et al., 2008)
	Reducing transactions errors (Qual5)	(Porter, 2005, Lai et al., 2006, N`Da et al., 2008)
	Increasing quality of relation with business partners (Qual6)	(Porter, 2005, Lai et al., 2006, N`Da et al., 2008)

4.5.3 Questionnaire layout

The questionnaire form is divided into the following 5 sections (see Appendix 1):

Section1 requests information about the manufacturing SME's number of employees.

Section 2 is concerned with the manufacturing SMEs' adoption levels of B2B e-commerce. It includes thirty six closed questions, and, for each question, the response ranged from not at all (1) to totally (5). This section helps to establish the current status of the manufacturing SMEs use of B2B e-commerce.

Section 3 is concerned with the factors affecting the level of adoption. This section comprised thirty five closed questions. For each item, the answer ranges from strongly disagree (1) to strongly agree (5). This section helps to identify the factors that have significant effect on each level of B2B e-commerce.

Section 4 is concerned with competitive advantage. It included 29 closed questions. It investigates around achieving competitive advantage in the small and medium manufacturers by using different levels of B2B2 e-commerce.

The final part is an open question and includes only one question. The purpose of this part is to give the respondents the opportunity to answer the questions in their own way. It can help to collect new data or issues around topic studied which they were not asked by researcher.

4.5.4 Population and sample size for questionnaire survey

A population is the full set of elements or cases from which a sample is drawn (Saunders et al., 2009). The reasons for using samples are the impracticality of studying the whole population; time; and cost. In addition, choosing the sample to study is significant to all forms of study. The two main sampling techniques are:

probability sampling (known, also, as representative sampling) and non-probability sampling (known, also, as judgemental sampling). In probability sampling, the probability, of each case being selected from the entire population, is known and, usually, is the same for all cases. On the other hand, in non-probability sampling, the probability of each case, selected from the entire population, is unknown (Vogt, 2007, Saunders et al., 2009).

Moreover, Zikmund (2000) stated that there are some criteria, such as research questions and objectives and research method, which could be used to choose between probability sampling and non-probability sampling. Additionally, probability sampling is associated most frequently with survey-based research, whereas non-probability sampling is used more commonly in case study research (Saunders et al., 2009). However, the probability sampling technique is preferred in research because it assists the researcher to maximize the validity of generalization (external validity), and eliminates bias from the case selection process (Vogt, 2007). This study chose the probability sampling because, as mentioned above, it is used commonly in survey-based research.

According to Saunders et al. (2009), the procedure of probability sampling comprises of the following steps: identify a suitable sampling frame based on the research objectives and questions; decide on a sample size; and select the suitable sampling technique.

4.5.4.1 Sampling frame

For any probability sample, the sampling frame is `a complete list of all the cases in the population from which your sample will be drawn` (Saunders et al., 2009, p.208). This study is concerned with manufacturing SMEs and, therefore, the sampling frame is the complete list of manufacturing SMEs in both the USA and Egypt. A complete list of the American manufacturing SMEs was available on the Small Business Administration databases (http://www.sba.gov/advocacy). There were 573,600 SMEs in America's manufacturing sector.

As regards Egypt, a complete list of the 164,179 manufacturing SMEs was available on the statistical database (part of the Egyptian Ministry of Industry and Foreign Trade) (http://www.mfti.gov.eg/SME/Statistics1.htm), of the development policies relating to the SME sector.

Furthermore, this study decided to contact the chief executive officers of the SMEs in the American and Egyptian study samples because they have extensive control over their companies' business activities and they have access, also, to all their companies' resources(Begley and Boyd, 1987). In addition, the CEOs of the SMEs was chosen as the single informant because they act as the ''principal architect of corporate strategy'' (Harrison, 1992), comprising investments and technological choices (Lefebvre et al., 1997).

4.5.4.2 Sample size

The determination of the sample size is important in building the number of sample which has to be neither low, to avoid the risk of inadequate information, nor high to avoid the risk of being inefficient (Scheaffer et al., 1986, Zain, 1995). The choice of sample size relies on several factors such as the size of the entire population; the level of margin of error required, the level of certainty; and the types of statistical techniques used to analyse the data (Saunders et al., 2009).

Typically, the research is worked to a 95% level of certainty. This suggests that, if the sample size of study selected 100 cases, at least ninety five of these samples would be sure to represent the features of the entire population. Regarding the margin of error, it describes the researcher's accuracy in estimating the population. In business and management studies, most researchers use a margin of plus or minus 3 to 5% of the true values. According to Saunders et al. (2009), the sample size required (n^a) can be calculated by using the following equation:

$$n^a = \frac{n \times 100}{re\ \%}$$

Where

n^a is the sample size required,

n is the adjusted minimum (or minimum) sample size

$re\ \%$ is the estimated response rate.

USA

Based on Saunders et al.'s (2009) formula, if the margin of error is selected to be 5% and the total population is between 100,000-1,000,000, the minimum sample size is 383 - 384. With regard to the response rate, Neuman (2000) stated that response rates were between 10 and 50% to the survey and 90% for face-to-face interviews. This study supposed that, in the USA sample, the response rate was 30% because the e-survey questionnaire would be used to collect the data. Then, the actual sample size, which should be used, was calculated using the following equation:

$$n^{\alpha} = \frac{384 \times 100}{30} = 1280\ subjects$$

Egypt

If the selected margin of error was to be 5% and the total population was between 100,000-1,000,000, the minimum sample size was 383 -384. Assuming that this study used an online survey and hand-delivered to collect data from Egyptian SMEs and that the Egyptian sample's response rate was 50%, the required sample size was calculated using the following equation:

$$n^{\alpha} = \frac{384 \times 100}{50} = 768\ subjcts$$

4.5.4.3 Sampling technique

Having selected an appropriate sampling frame and identified the necessary sample size, the study needed to choose the most suitable sampling technique in order to

gain a probability sample. The following techniques can be used to choose a probability sample: stratified; cluster sampling; and random sample. A stratified sample is suitable when the sampling frame contains two groups such as adopters or no adopters of e-commerce. Cluster sampling is similar to stratified sampling because the study needs to divide the population into groups (Henry, 1990). According to the random sample, it is appropriate for a geographically dispersed area if the study uses postal or online questionnaires techniques to collect the data.

In addition, the selection of the probability sampling technique depends on the study's questions and objectives; the nature of the sampling frame; the required sample size; and the technique used to collect the data (Saunders et al., 2009). This study used a technique of simple random sampling to obtain a comprehensive sample. Based on this technique and in order to contact them, this study selected randomly 1,280 manufacturing SMEs in the American sample and 768 manufacturing SMEs in the Egyptian sample.

4.6 Pretesting questionnaire of study

4.6.1 Face and content validity

Validity indicates the extent to which the measuring instrument or scale measures what it is assumed to measure (Bryman and Bell, 2007, Saunders et al., 2009). In addition, validity is concerned with how the concept is defined by the measure (Hair et al., 2006). Face validity refer to the scale, or question, looks to reflect what it was supposed to measure (Saunders et al., 2009).

Saunders et al. (2009) suggested that the researcher could use friends or family to test the face validity of the questionnaire. These provide the researcher with at least some idea of the on the face validity of their questionnaire. Therefore, in order to achieve this validity, twenty five Business School PhD students checked the first draft of the questionnaire to establish that they could understand the questions. Also, they were invited to criticize the questionnaire's readability and its design. Most of the comments related to the design of the questionnaire, this resulted in the researcher designing it in a new form.

Content validity indicates the extent to which the measurement instrument provides acceptable coverage of the investigative questions (Saunders et al., 2009). This type of validity can be achieved in different ways. For instance, the study topic should be defined carefully and a group of experts should evaluate the questionnaire and comment on its suitability and representativeness (Vogt, 2007). This study's aim is to identify the factors which affected SMEs implementing the levels of B2B e-commerce and the competitive advantage to them in doing so.

Therefore, the researcher sent the second draft of the questionnaire to a group of academic staff (professors and lecturers) of, Plymouth University's Business School. Also, the researcher sent the questionnaire to professors, who had undertaken similar work within this area and knew the issues involved to check its content validity and who worked in other Universities both inside and outside the UK. This group's feedback encompassed the following: (1) the questionnaire was very long; (2) there were overlaps between some questions; (3) some question were unclear

and ambiguous; and (4) the format of the questionnaire was very spread out and the questions ought to be a little tighter. On considering the experts' feedback, the researcher removed, from the questionnaire, the repetitive questions, and other items which were identified as ambiguous.

The researcher produced a third draft of the questionnaire which was ready for piloting with manufacturing SMEs. As during the testing face and content validity of the questionnaire, the group of experts recommended that the questionnaire ought to be piloted with SMEs to assess the reliability of the constructs in both the American and Egyptian contexts. However, it was decided to translate the questionnaire form its original English version into the Arabic language before proceeding to pilot it with manufacturing SMEs in both the American and Egyptian contexts. This was because the Arabic language is the mother tongue of the Egyptian respondents.

4.6.2 Translation of questionnaire

In this respect, Usunier (1998) and Saunders et al. (2009) mentioned that there are a number of methods, such as direct translation and back-translation which could be used to translate the questionnaire. According to direct translation, the source questionnaire is translated directly to target language. It is the simplest translation technique and relatively inexpensive. However, it can lead to discrepancies in meaning between the source and target questionnaire.

Using the back-translation technique, the source questionnaire is translated to target language and, then, the target questionnaire is translated back into the original language so that it can be compared with the source questionnaire. Although this technique is somewhat expensive, it can correct most translation problems. Therefore, this study used the back-translation technique to translate the English questionnaire into the Arabic language and, then, back again. Two specialist English native speakers, who held a PhD in Linguistics, compared the newly sourced questionnaires with the original one. They found that in the newly sourced questionnaires, some items had different meanings. Therefore, these items were rephrased in final form of questionnaire.

4.6.3 Pilot study

A pilot study is a trail run of the study's measurement instrument (Carter, 1997). Bell (2005) and Saunders et al. (2009) stated that the researcher ought to give the questionnaire a trial run because, without a trial run, the researcher have no way of knowing whether or not the questionnaire would succeed.

In addition, a pilot study should be conducted on a small sample drawn from the same population from which the final sample of the study is drawn (Offredy and Vickers, 2010, McNabb, 2013). Some researchers, such as Saunders et al. (2009), stated that a sample of ten is considered acceptable to be for piloting questionnaires. For the purpose of piloting this study, the researcher sent the questionnaires (e-surveys) to the Chief Executive Officer of 50 manufacturing SMEs in both the USA and Egypt.

The pilot study's main aim is to check the reliability and validity of the questionnaire. Reliability indicates the degree to which a measure creates compatible results (Sarantakos, 1998). One form of reliability is internal consistency; this is defined as the extent to which ` the items are consistent with each other and are all working in the same direction` (Punch, 2005, p 99). Additionally, internal consistency is measured by calculating Cronbach's alpha (Saunders et al., 2009).

Moreover, Cronbach's alpha measures the degree to which the item used is internally reliable with other items including construct. It takes values ranging between 1 (denoting the items correlate perfectly) and 0 (denoting the items are totally inconsistent). A high value represents good internal consistency of the indicators in the latent variable (George and Mallery, 2003). In general, researchers agree that a value of 0.5 or less is regarded to be an unacceptable scale. Whilst, some have stated the above 0.6 is required to be regarded as reliable (Malhotra, 2004). However, the ideal value should be at least 0.7 (Vogt, 2007, Field, 2009, Hair et al., 2010). In order to test the reliability of each construct, in this questionnaire, the researcher used the SPSS to calculate the coefficient of Cronbach's Alpha.

With regard to the American context, the values of Cronbach's alpha, for all this study's constructs, were.897 for level A (1); .918 for level B(2); .964 for level C(3); and .966 for level D (4); .971 for relative advantage; .971 for compatibility; .858 for complexity; .940 for top management support; .959 for competitive pressure; .955 for business partner pressure ; .958 for Government support; .959 for cost reduction; .952 for differentiation; .954 for growth; and .955 for quality items. As can be seen

from Table 4.3, these results indicate the strong reliability of the variables which exceed the minimum standard of Cronbach's Alpha = 0.7. These values highlight the reliability of the variables in this study's questionnaire.

Furthermore, the researcher used the values of corrected item-total correlations to determine a group of candidate indicators to be retained in a construct. These would achieve construct validity. In addition the corrected item–total correlation statistics are gained from reliability statistics. There is some discussion about the values of corrected item-total correlations to be used to determine which indicators remained in a construct. Field (2009) stated that the value of correlations ought to be above 0.30., while Netemeyer et al. (2003) stated that the value ought to be greater than 0.35, and that an indicator with less than 0.35 must be removed to increase the reliability of the construct. In this study, the value used to achieve construct validity is that an indicator ought to be retained if it is higher than 0.35.

Table 4-3 shows that the indicator loadings were between .605 and .962 in `corrected item-total correlations`, these denoted that the indicators are valid for measuring the latent constructs in questionnaire. These meant that all constructs were found to be reliable, and valid.

Table 4-3: Reliability analysis for item constructs: USA context

Construct	***Corrected***	***Cronbach's***	***Cronbac***
Level A(1)	***Item-Total***	***Alpha if***	***h's***
	Correlation	***Item***	***Alpha***
		Deleted	

LevelA1= Seeking out new suppliers	*.758*	*.872*	
levelA2= Seeking out products/ services	*.789*	*.866*	
levelA3= Advertising the company and/ or its products/ services	*.766*	*.870*	*.897*
levelA4= Seeking out new customers	*.659*	*.893*	
levelA5= Converting information on products/ services into digital form	*.766*	*.871*	
Level B(2)			
levelB1= Buying products/ services using electronic catalogues	*.681*	*.912*	
levelB2= Placing and managing orders with suppliers	*.739*	*.907*	
levelB3= Accessing supplier's product/services database	*.861*	*.894*	*.918*
levelB4= Selling products/ services using electronic catalogues	*.823*	*.897*	
levelB5= Receiving and managing customer orders	*.706*	*.910*	
levelB6= Accessing customer's product/ service databases	*.691*	*.912*	
levelB7= Offering customers after-sales service	*.742*	*.907*	
Level C(3)			
levelC1= Buying products/services by electronic auction	*.838*	*.960*	
levelC2= Buying products/services by issuing electronic calls for tenders	*.891*	*.958*	
levelC3= Negotiating contracts (price, volume, etc.) with suppliers	*.683*	*.964*	
levelC4= Making electronic payment to suppliers	*.778*	*.961*	
levelC5= Allowing customers to access the company's inventories	*.893*	*.958*	
levelC6= Accessing customer's inventories	*.782*	*.961*	*.964*
levelC7= Allowing suppliers to access the company's inventories	*.919*	*.958*	
levelC8= Accessing supplier's inventories	*.855*	*.959*	
levelC9= Selling products/services by electronic auction	*.794*	*.961*	
levelC10= Selling products/services by responding to electronic calls for tenders	*.874*	*.959*	
levelC11= Negotiating contracts (price, volume, etc.) with customers	*.746*	*.962*	
levelC12= Receiving electronic payments from customers	*.710*	*.963*	
Level D(4)			
levelD1= Transferring documents and technical drawing to customers	*.707*	*.966*	
levelD2= Transferring documents and technical drawing to suppliers	*.800*	*.964*	
levelD3= Integrating software supporting product design (e.g. CAD/ CAM, VPDM, PDM)	*.805*	*.964*	
levelD4= Doing collaborative on-line engineering with suppliers	*.910*	*.961*	
levelD5= Doing collaborative on-line engineering with customers	*.867*	*.962*	
levelD6= Automating the production floor using manufacturing execution system (MES)	*.910*	*.961*	*.966*
levelD7= Integrating the MES into the management information system	*.917*	*.960*	
levelD8= Ensuring the management of quality assurance using the management information system	*.801*	*.964*	
levelD9= Automating distribution/ logistics using a logistics execution system (LES)	*.877*	*.962*	
levelD10= Allowing distribution/ transportation partners to access the information they need (SKU, quantity turnaround , etc.) in order to reduce time and costs related to distribution	*.840*	*.963*	
levelD11= Optimizing returns management (``reverse logistics``)	*.813*	*.963*	
levelD12= Tracking products (purchased and sold) during transportation	*.628*	*.968*	
Relative advantage			
relative1= Using B2B e-commerce would enable my company to accomplish specific task more quickly	*.899*	*.967*	
relative2= Using B2B e-commerce would improve my job performance	*.899*	*.967*	
relative3= Using B2B e-commerce in my job would increase my productivity	*.909*	*.966*	*.971*
relative4= using B2B e-commerce would enhance my effectiveness	*.914*	*.965*	

on the job			
relative5= using B2B e-commerce would make it easier to do my job	*.911*	*.965*	
relative6= I would find B2B e-commerce useful in my job	*.909*	*.966*	
Compatibility			
compati.1= Using a B2B e-commerce is compatible with all aspects of our work	*.891*	*.969*	
compati.2= Using B2B e-commerce is consistent with our company`s culture	*.915*	*.965*	
compati.3= Attitudes towards B2B e-commerce adoption in our company have been favourable	*.890*	*.969*	*.971*
compati.4= B2B e-commerce adoption is compatible with our information technology infrastructure	*.930*	*.962*	
compati.5= B2B e-commerce adoption is consistent with our business strategy	*.962*	*.957*	
Complexity			
complex.1= The skills required to use B2B e-commerce are too complex for our employees	*.590*	*.866*	
complex.2= Integrating these technologies in our current work practices will be very difficult	*.811*	*.773*	*.858*
complex.3= I believe that B2B e-commerce is cumbersome to use	*.605*	*.858*	
complex.4= Using B2B e-commerce is often frustrating	*.820*	*.769*	
Top management support			
topM.1= The owner/manager is interested in the adoption of the B2B e-commerce	*.682*	*.941*	
topM.2= The owner/manager considers B2B e-commerce adoption is important to the company	*.874*	*.924*	
topM.3= The owner/manager has effectively communicated its support for B2B e-commerce adoption	*.848*	*.927*	*.940*
topM.4= The owner/manager has allocated adequate resources to adoption of B2B e-commerce	*.877*	*.924*	
topM.5= The owner/manager actively encourages employees to use the new technologies in their daily tasks	*.756*	*.935*	
topM.6= The owner/manager is committed to the use of the B2B e-commerce	*.873*	*.925*	
topM.7= The owner/manager desires to project the company as a leader in the use of new technologies	*.722*	*.939*	
Competitive pressure			
Competitive p. 1= We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce	*.875*	*.952*	
Competitive p.2= We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace	*.854*	*.953*	*.959*
Competitive p. 3= Our competitors in market drive our company to use B2B e-commerce	*.901*	*.949*	
Business partner pressure			
Business p.p. 1= Our suppliers demand us to use B2B e-commerce for doing business with them	*.866*	*.952*	*.955*
Business p.p. 2= our customers demand us to use B2B e-commerce for doing business with them	*.886*	*.951*	
Business p.p. 3= Our suppliers are using B2B e-commerce	*.791*	*.958*	
Business p.p. 4= Our customers are using B2B e-commerce	*.832*	*.955*	
Government support			
government.1= The government plays an important role in promoting B2B e-commerce in SMEs	*.906*	*.946*	
government.2= The government provides incentives to using B2B e-commerce in SMEs	*.906*	*.946*	
government.3= Business laws support electronic business	*.801*	*.957*	*.958*

government.4= The government is helping in giving all kinds of assistance to help small business to use B2B e-commerce	*.882*	*.949*	
government.5= The government often informs us about the good points of B2B e-commerce	*.878*	*.949*	
government.6= Support from government is important to encourage us to use more of the B2B e-commerce in business	*.843*	*.953*	
Cost reduction			
costredu.1= Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)	*.845*	*.953*	
costredu.2= Reducing inventory costs	*.774*	*.956*	
costredu.3= Reducing operational costs	*.853*	*.952*	
costredu.4= Reducing costs of marketing, advertisement and sale of products/ services	*.797*	*.955*	
costredu.5= Reducing transaction costs	*.879*	*.951*	*.959*
costredu.6= Reducing coordination costs	*.854*	*.952*	
costredu.7= Reducing customer support costs	*.853*	*.953*	
costredu.8= Reducing document processing costs (e.g.: costs of document storage and manipulation, etc.)	*.822*	*.954*	
costredu.9= Reducing document publication costs (e.g.: costs of catalogues and brochures publishing)	*.800*	*.955*	
Differentiation			
differe.1= Providing new products/services to customers	*.839*	*.945*	
differe.2= Providing better products/services to customers	*.799*	*.948*	
differe.3= Providing easier customer access to information	*.797*	*.948*	
differe.4= Speeding up transactions	*.845*	*.944*	*.952*
differe.5= Enhancing the credibility and prestige of the organisation	*.859*	*.943*	
differe.6= Increasing ability for customers to customize products and services	*.894*	*.940*	
differe.7= Enhancing brand distinguishability	*.824*	*.946*	
Growth			
growth1= Enhancing business efficiency	*.855*	*.946*	
growth2= Better achieve organisation goals	*.834*	*.948*	*.954*
growth3= Increasing market share	*.810*	*.950*	
growth4= Increasing sales	*.874*	*.944*	
growth5= Increasing revenue	*.908*	*.941*	
growth6= Increasing customer satisfaction	*.846*	*.947*	
growth7= Entering new markets	*.773*	*.953*	
Quality			
quality1= Increasing quality of customer service (e.g. quick responses to customer inquiries, promptly follow- up customer claims and complaints, etc.)	*.826*	*.950*	
quality2= Fast delivery	*.863*	*.947*	
quality3= Increasing products /services quality	*.782*	*.955*	*.955*
quality4= Increasing information quality	*.855*	*.947*	
quality5= Reducing transactions errors	*.856*	*.948*	
quality6= Increasing quality of relation with business partners	*.889*	*.945*	

For the Egyptian context, the values of Cronbach's alpha for all this study's main constructs, were .822 for level A (1); .810 for level B (2), .723 for level C (3); .824 for level D (4); .712 for relative advantage; .760 for compatibility; .934 for complexity;

.749 for top management support; .714 for competitive pressure; .765 for business partner pressure;.738 for Government support; .757 for cost reduction; .713 for differentiation; .736 for growth; and .793 for quality items. As can be seen from Table 4-4, these results indicate the adequate reliability of the variables which exceed the minimum standard of Cronbach's Alpha= 0.7.

In addition, Table 4-4 shows that the Indicator loadings were between .360 and .945 in `corrected item-total correlations`. These indicated that the indicators are valid for measuring the constructs in questionnaire. These suggest that all constructs were found to be reliable, and valid.

Table 4-4: Reliability analysis for item constructs: Egyptian context

Construct	***Corrected Item-Total Correlation***	***Cronbach's Alpha if Item Deleted***	***Cronbach's Alpha***
Level A(1)			
LevelA1= Seeking out new suppliers	.661	.773	
levelA2= Seeking out products/ services	.839	.724	
levelA3= Advertising the company and/ or its products/ services	.527	.813	.822
levelA4= Seeking out new customers	.836	.734	
levelA5= Converting information on products/ services into digital form	.360	.873	
Level B(2)			
levelB1= Buying products/ services using electronic catalogues	.446	.802	
levelB2= Placing and managing orders with suppliers	.633	.771	
levelB3= Accessing supplier's product/services database	.608	.775	
levelB4= Selling products/ services using electronic catalogues	.389	.828	
levelB5= Receiving and managing customer orders	.665	.768	
levelB6= Accessing customer's product/ service databases	.583	.779	.810
levelB7= Offering customers after-sales service	.638	.768	
Level C(3)			
levelC1= Buying products/services by electronic auction	.374	.7 40	
levelC2= Buying products/services by issuing electronic calls for tenders	.360	.7 38	
levelC3= Negotiating contracts (price, volume, etc.) with suppliers	.489	.7 92	
levelC4= Making electronic payment to suppliers	.370	.8 22	
levelC5= Allowing customers to access the company's inventories	.365	.8 26	
levelC6= Accessing customer's inventories	.373	.7 41	

levelC7= Allowing suppliers to access the company's inventories	. 381	.7 39	.723
levelC8= Accessing supplier's inventories	.465	.7 97	
levelC9= Selling products/services by electronic auction	. 379	.7 49	
levelC10= Selling products/services by responding to electronic calls for tenders	.381	.7 14	
levelC11= Negotiating contracts (price, volume, etc.) with customers	. 370	.7 53	
levelC12= Receiving electronic payments from customers	. 397	.7 28	
Level D(4)			
levelD1= Transferring documents and technical drawing to customers	.757	.780	
levelD2= Transferring documents and technical drawing to suppliers	.657	.795	
levelD3= Integrating software supporting product design (e.g. CAD/ CAM, VPDM, PDM)	.360	.839	
levelD4= Doing collaborative on-line engineering with suppliers	.682	.796	
levelD5= Doing collaborative on-line engineering with customers	.390	.837	
levelD6= Automating the production floor using manufacturing execution system (MES)	.485	.811	.824
levelD7= Integrating the MES into the management information system	.549	.804	
levelD8= Ensuring the management of quality assurance using the management information system	.701	.788	
levelD9= Automating distribution/ logistics using a logistics execution system (LES)	.360	.822	
levelD10= Allowing distribution/ transportation partners to access the information they need (SKU, quantity turnaround , etc.) in order to reduce time and costs related to distribution	.736	.785	
levelD11= Optimizing returns management (``reverse logistics``)	.370	.831	
levelD12= Tracking products (purchased and sold) during transportation	.736	.785	
Relative advantage			
relative1= Using B2B e-commerce would enable my company to accomplish specific task more quickly	.647	.71	
relative2= Using B2B e-commerce would improve my job performance	.596	.73	
relative3= Using B2B e-commerce in my job would increase my productivity	.632	.70	.712
relative4= using B2B e-commerce would enhance my effectiveness on the job	360	.711	
relative5= using B2B e-commerce would make it easier to do my job	.360	.703	
relative6= I would find B2B e-commerce useful in my job	.426	.700	
Compatibility			
compati.1= Using a B2B e-commerce is compatible with all aspects of our work	. 450	.759	
compati.2= Using B2B e-commerce is consistent with our company`s culture	.728	.7 76	. 760
compati.3= Attitudes towards B2B e-commerce adoption in our company have been favourable	.360	.715	
compati.4= B2B e-commerce adoption is compatible with our information technology infrastructure	.743	.7 79	
compati.5= B2B e-commerce adoption is consistent with our business strategy	.438	.7 45	
Complexity			

complex.1= The skills required to use B2B e-commerce are too complex for our employees	.630	.982	
complex.2= Integrating these technologies in our current work practices will be very difficult	.945	.881	.934
complex.3= I believe that B2B e-commerce is cumbersome to use	.914	.891	
complex.4= Using B2B e-commerce is often frustrating	.913	.892	
Top management support			
topM.1= The owner/manager is interested in the adoption of the B2B e-commerce	.585	.7 67	
topM.2= The owner/manager considers B2B e-commerce adoption is important to the company	.440	.7 29	
topM.3= The owner/manager has effectively communicated its support for B2B e-commerce adoption	.755	.7 92	.749
topM.4= The owner/manager has allocated adequate resources to adoption of B2B e-commerce	.363	.749	
topM.5= The owner/manager actively encourages employees to use the new technologies in their daily tasks	.360	.7 64	
topM.6= The owner/manager is committed to the use of the B2B e-commerce	.754	.7 88	
topM.7= The owner/manager desires to project the company as a leader in the use of new technologies	.362	.75	
Competitive pressure			
Competitive p. 1= We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce	.367	.715	
Competitive p.2= We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace	.370	.7 33	.714
Competitive p. 3= Our competitors in market drive our company to use B2B e-commerce	.390	.753	
Business partner pressure			
Business p.p. 1= Our suppliers demand us to use B2B e-commerce for doing business with them	.470	.824	
Business p.p. 2= our customers demand us to use B2B e-commerce for doing business with them	.537	. 721	.765
Business p.p. 3= Our suppliers are using B2B e-commerce	.486	. 769	
Business p.p. 4= Our customers are using B2B e-commerce	.846	.765	
Government support			
government.1= The government plays an important role in promoting B2B e-commerce in SMEs	757	.7 15	
government.2= The government provides incentives to using B2B e-commerce in SMEs	.370	.769	
government.3= Business laws support electronic business	.364	.769	
government.4= The government is helping in giving all kinds of assistance to help small business to use B2B e-commerce	.923	.7 31	.738
government.5= The government often informs us about the good points of B2B e-commerce	.900	.7 26	
government.6= Support from government is important to encourage us to use more of the B2B e-commerce in business	.400	.769	
Cost reduction			
costredu.1= Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)	482	.731	
costredu.2= Reducing inventory costs	.635	.706	
costredu.3= Reducing operational costs	.849	.740	
costredu.4= Reducing costs of marketing, advertisement and sale of products/ services	.361	.769	
costredu.5= Reducing transaction costs	. 410	.776	
costredu.6= Reducing coordination costs			

costredu.7= Reducing customer support costs	.863	.749	.757
costredu.8= Reducing document processing costs (e.g.: costs of document storage and manipulation, etc.)	.382 . 421	.782 .770	
costredu.9= Reducing document publication costs (e.g.: costs of catalogues and brochures publishing)	.594	.706	
Differentiation			
differe.1= Providing new products/services to customers	.543	.740	
differe.2= Providing better products/services to customers	.590	.7 52	
differe.3= Providing easier customer access to information	.369	.7 41	
differe.4= Speeding up transactions	.360	.7 03	
differe.5= Enhancing the credibility and prestige of the organisation	.646	.7 31	.713
differe.6= Increasing ability for customers to customize products and services	.3 91	.7 39	
differe.7= Enhancing brand distinguishability	.380	.740	
Growth			
growth1= Enhancing business efficiency	.492	.788	
growth2= Better achieve organisation goals	.364	.735	
growth3= Increasing market share	.695	.764	
growth4= Increasing sales	.521	.763	.736
growth5= Increasing revenue	.362	.744	
growth6= Increasing customer satisfaction	.392	.771	
growth7= Entering new markets	.364	.714	
Quality			
quality1= Increasing quality of customer service (e.g. quick responses to customer inquiries, promptly follow- up customer claims and complaints, etc.)	.580	.711	
quality2= Fast delivery	.370	.755	.793
quality3= Increasing products /services quality	.363	.768	
quality4= Increasing information quality	.387	.734	
quality5= Reducing transactions errors	.412	.763	
quality6= Increasing quality of relation with business partners	.382	.731	

In summary, the results of the pilot study revealed that the all latent variables are reliable. There was a good distribution of the participants' answers across all items/indicators; this showed that the respondents could distinguish between the constructs. With regard to the American context, corrected item-total correlations ranged from .605 to .962, whilst, in Egypt, corrected item-total correlations ranged between .360 and .945. These results meant that no indicator /item were redundant and, therefore, no indicators/items were deleted. The pilot study assists the researcher to identify problems and to address them before the final survey is launched. The researcher identified no problems in the pilot study's results.

Consequently, the questionnaire could be used in the main survey to collect data from manufacturing SMEs in both the USA and Egypt. The next section shows the data collection processes and response rates.

4.7 Analysis procedures of survey questionnaire

This study used Structural Equation Modelling (SEM) to analyse the quantitative data.

4.7.1 Structural equation modelling

Structural Equation Modelling (SEM) is considered to be one of the most important elements of applied multivariate statistical analysis and has been used by many researchers in social and behavioural studies (Pugesek et al., 2003). This technique is used to examine a hypothesized model which describes the relationships between constructs (Schumacker and Lomax, 2004). In addition, the SEM analysis includes two phases: the measurement model; and the structural model (Gefen et al., 2000).

The measurement model measures the relationships between the latent variables (unobserved variables) and indicators (observed variables). On the other hand, the structured model examines the relationships between the latent variables (unobserved variables) (Hox, 2010, Hair et al., 2010). The measurement model gives an assessment of how appropriate the newly established latent variables are together and whether or not they are connected adequately to their indicators (Hair

et al., 2006). Before starting proceeding with the structural model (Brown, 2006), the measurement model is used to measure the validity and reliability of the constructs.

Furthermore, like that used by AMOS, the SEM technique can be covariance-based or variance-based like that used in PLS analysis (Hair et al., 2011). The following section discusses the characteristics of both covariance-based SEM and variance-based SEM.

4.7.2 Covariance-based SEM versus Variance-based SEM

The Covariance-based SEM method is considered to be one of the best-known SEM methods (Chin, 1998), and there are some available software programs to implement Covariance-based SEM. Examples are LISREL, AMOS, CALIS, EQS, and SEPATH (Anddreev et al., 2009). However, Covariance-based SEM has a number of restraints which makes it inappropriate for some types of research. It requires a large sample size and normality. Besides, this type of analysis technique requires reflective constructs (a latent variable is described as a reflective construct if the items are influenced by the construct, and these items are expected to be correlated) (Gefen et al., 2000).

Partial Least Square (PLS) is a variance-based SEM technique used extensively in Information Systems research (i.e.,Bock et al., 2005, Park et al., 2007). Developed by Wold (1975) for states where data could not meet the restrictive rules of covariance-based SEM techniques (Fornell and Bookstein, 1982), it is used to estimate the parameters of a measurement and structural model. There are number of available

software programs such as, LVPLS 1.6 and 1.8 (Lohm¨oller, 1984), PLS-Graph 3.0 (Chin, 2001), and WarpPLS 3.0 (Kock, 2012) to implement PLS-SEM. This study used WarpPLS 3.0. Moreover, the PLS technique has several advantages over covariance-based SEM. For example, PLS does not require a large sample size which can create significant p values and stable path coefficients. With a sample size fewer than 100 (Kock, 2012), PLS can deal with both reflective and formative latent variables (Gefen et al., 2000, Henseler et al., 2009). A construct is described as a formative construct if the items cause the latent variable (Thompson et al., 1995), and the items are not expected to be correlated (Chin, 1998).In addition, PLS can estimate a model which is complex and comprises of a large number of items or constructs. Also, if the data does not meet the normality, it can handle a larger number of indicators (Chin and Newsted, 1999).

Furthermore, PLS does not have an identification problem (Fornell and Bookstein, 1982), and this means that latent variables do not need to have the least of three items (Chin, 2001, Westland, 2007) which are required by covariance-based SEM techniques. In this study, the researcher chose the PLS technique of SEM (specifically Warp PLS 3.0) because of its ability to handle both formative and reflective latent variables. The following section explains briefly why Warp PLS 3.0 software was selected.

4.7.3 Warp PLS 3.0

Kock (2012) developed WarpPLS 3.0, it is a software package which, using a PLS regression, helps to conduct Structural Equation Modelling (SEM) analysis.

Furthermore, WarpPLS 3.0 provides a number of characteristics which are unavailable in other PLS-PM (variance-based SEM) software. These are namely, effect size; P-values for all weights and loadings: standard errors for all weights and loadings, variance inflation factors (VIFs) for all indicators; predictive validity; estimated collinearity; full collinearity variance inflation factors (full collinearity VIFs); ranked data and restricted range; and indirect and total effects (Kock, 2012). Therefore, the researcher chose Warp PLS 3.0 software to conduct this study's SEM (for further information about Warp PLS 3.0 software, see Kock, 2012).

4.8 Summary

This study used the quantitative method based on the positivism philosophy and deductive approach. In addition, the researcher addressed the face, content and construct validity and reliability of the questionnaire to ensure that the constructs measured what they were expected to measure. 25 doctorate students checked the first draft of questionnaire to judge its readability and design. Afterwards, the researcher sent the second draft of the questionnaire to a group of academics to ensure that the questionnaire covered the topics which it was meant to study. Next, the researcher piloted the questionnaire in order to assess the reliability and validity of the study main latent variables. The statistic results show that all constructs are reliable and valid. The questionnaire was translated into the Arabic language in order to collect data from manufacturing SMEs in Egypt. The back-translation technique was used for translating the questionnaire. 320 and 260 forms, valid and free of missing data, were collected from the American and Egyptian manufacturing SMEs respectively.

Chapter 5: Data analysis

5.1 Introduction

This chapter presents and analyses the results of the study. It starts with the descriptive statistics of American and Egyptian responses. In addition, the researcher used the T-test to check the Non-response bias in both contexts. Next, the chapter moves to describe the structural equation model Partial Least Squares (PLS) technique which is followed by the measurement models. Then, the chapter presents a structural model conceptualizing the fundamental relationships between the study's variables which are: the affecting factors (technological context, organisational context, and environmental context); the adoption levels; and competitive advantage. This is followed by undertaking this model's fit indices. Finally, obtained by using a t-test, the chapter moves to illustrate the differences in the levels of competitive advantage gained by the American and Egyptian SMEs.

5.2 Main survey and response rates

The study used a survey to collect data from the owner-managers of the manufacturing SMEs in both the USA and Egypt. In business and management studies, the questionnaire survey is used most commonly to collect data because it allows a large quantity of data to be collected from the research population in a highly economical way (Saunders et al., 2009). The researcher used an e-survey to collect data from the American SMEs. Following the failure, probably due to cultural concerns, of an attempt to do so only by means of an online survey, the researcher used a hand-delivered and e-survey to collect data from Egyptian SMEs. The instructions, included with the questionnaire, stated that it ought to be completed

by the owner-manager of the business. The questionnaire comprised a series of Likert-type (1-5 disagree/agree) statements developed from the literature review.

This study sent questionnaires randomly to 1,280 manufacturing SMEs in the USA, and to 768 manufacturing SMEs in Egypt. In addition, the researcher chose only those SMEs with websites. In order to test the accuracy of the data, the researcher checked for missing data. Indications of missing data are "information not available for a case (or subject) for which other information is available" (Hair et al., 2006, p 38). Generally, missing data is caused by the respondents refusing to respond to one or more questions of the questionnaire. From the American sample, the researcher excluded 30 returned questionnaires with missing data. From the Egyptian sample, the researcher excluded 24 returned questionnaires with missing data. Consequently, there remained 320 and 260 forms, valid and free of missing data, from the USA and Egypt respectively. The resulting response rate is 25% (320 ÷1,280) for the USA and 33.9 % (260÷768) for Egypt.

5.3 Descriptive statistics

This section presents descriptive statistics for the main survey. It comprises of the factors affecting the adoption of B2B e-commerce (technological factors, organisational factors, and environmental factors); the adoption levels (level1, level2, level3 and level4) of B2B e-commerce; and competitive advantage (cost reduction, differentiation, growth and quality).

5.3.1 Levels of B2B e-commerce adoption

Generally, on adoption level 1, the average of the American manufacturing SMEs` responses ranged from 'About Average' (3.03) on 'Seeking out new suppliers' to 'A Lot' (3.59) on 'Advertising the company and/ or its products/ services. On the other hand, the Egyptian manufacturing SMEs' responses average is 'A little` (2) on 'Seeking out new customers' to' About Average' (3.01) on 'Advertising the company and/ or its products/ services'. These responses show that American and Egyptian manufacturing SMEs have implemented all eBPs from B2B e-commerce adoption level1. Table 5-1 shows the descriptive statistics of level 1 of adoption for both US and Egyptian manufacturing SMEs.

Table 5-1: Descriptive statistics of level 1 of adoption

Level 1	Contexts	Not at all		A little		About Average		A Lot		Totally		Mean
		F	%	F	%	F	%	F	%	F	%	
Seeking out new suppliers	**US**	45	14.1	58	18.1	88	27.5	101	31.6	28	8.8	3.03
	Egypt	65	25	63	24.2	112	43	17	6.5	3	1.15	2.346
Seeking out products/ services	**US**	3	.93	62	19.3	130	40.6	105	32.8	20	6.25	3.240
	Egypt	65	25	63	24.2	112	43	17	6.5	3	1.15	2.346
Advertising the company and/ or its products/ services	**US**	-	-	60	18.8	80	25.0	153	47.8	27	8.4	3.59
	Egypt	3	1.6	65	25	118	45.3	73	28	1	.38	3.01
Seeking out new customers	**US**	38	11.9	11.9	38	77	24.1	128	40.0	39	12.2	3.29
	Egypt	63	24.2	187	71.9	5	1.9	5	1.9	-	-	2
Converting information on products/ services into digital form	**US**	22	6.9	49	15.3	78	24.4	100	31.3	71	22.2	3.5
	Egypt	65	25	63	24.2	112	43	18	6.9	2	0.76	2.3

In terms of the level 2 of adoption, the average American manufacturing SMEs` responses ranged from 'About Average' (2.72) on 'Selling products/ services using electronic catalogues' to 'A Lot' (3.5) on 'Receiving and managing customer orders `. On the other hand, the average of the Egyptian manufacturing SMEs' responses is 'not at all` (1) on 'Accessing supplier's product/services database' to 'a little ' (1.78) on 'Offering customers after-sales service'. Table 5-2 illustrates the descriptive statistics of the American and Egyptian manufacturing SMEs adopting level 2 of B2B e-commerce adoption. These responses justify that Egyptian manufacturing SMEs have implemented only two eBPs from B2B e-commerce adoption level 2, in this stage, it is clear that the Egyptian firms use the internet only for receiving/managing customer orders and offering after-sales services for customers. On the other hand, the American enterprises have implemented all eBPs from B2B e-commerce adoption level 2.

Table 5-2: Descriptive statistics of level 2 of adoption

Level 2	Contexts	Not at all		A little		About Average		A Lot		Totally		Mean
		F	%	F	%	F	%	F	%	F	%	
Buying products/ services using electronic catalogues	**US**	59	18.4	66	20.6	71	22.2	105	32.8	19	5.9	2.87
	Egypt	200	76.9	60	23	-	-	-	-	-	-	1.23
Placing and managing orders with suppliers	**US**	42	13.1	26	8.1	88	27.5	125	39.1	39	12.2	3.29
	Egypt	221	85	39	15	-	-	-	-	-	-	1.15
Accessing supplier's product/services database	**US**	50	15.6	46	14.4	95	29.7	101	31.6	28	8.8	3.03
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Selling products/ services using electronic catalogues	**US**	90	28.1	48	15.0	70	21.9	87	27.2	25	7.8	2.72
	Egypt	210	80.7	50	19.23	-	-	-	-	-	-	1.19
Receiving and managing customer orders	**US**	35	10.9	24	7.5	81	25.3	128	40.0	52	16.3	3.5
	Egypt	123	47.3	137	52.6	-	-	-	-	-	-	1.53
Accessing customer's product/	**US**	65	20.3	52	16.3	72	22.5	107	33.4	24	7.5	2.92

service databases	**Egypt**	260	100	-	-	-	-	-	-	-	-	1
Offering customers after-sales service	**US**	60	18.8	39	12.2	75	23.4	110	34.4	36	11.3	3.07
	Egypt	102	39	137	52.6	21	8.07					1.78

For the level 3 of adoption, Table 5-3 shows that the average of the American manufacturing SMEs` responses ranged from 'a little' (2.28) on 'Selling products/services by electronic auction' to 'About Average' (3.01) on 'Receiving electronic payments from customers`. The average of the Egyptian manufacturing SMEs ranged from 'Not at all' (1) on 'Selling products/services by electronic auction' to 'A little' (1.7) on 'Negotiating contracts (price, volume, etc.) with suppliers'. In this stage, the Egyptian enterprises implemented five eBPs compared to the American firms' twelve.

Table 5-3: Descriptive statistics of level 3 of adoption

Level 3	**Contexts**	**Not at all**		**A little**		**About Average**		**A Lot**		**Totally**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Buying products/services by electronic auction	**US**	123	38.4	50	15.6	46	14.4	82	25.6	19	5.9	2.45
	Egypt	243	93.4	17	6.54	-	-	-	-	-	-	1.06
Buying products/services by issuing electronic calls for tenders	**US**	127	39.7	51	15.9	47	14.7	79	24.7	16	5.0	2.39
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Negotiating contracts (price, volume, etc.) with suppliers	**US**	66	20.6	37	11.6	82	25.6	107	33.4	28	8.8	2.98
	Egypt	119	45.7	103	39.6	38	14.6	-	-	-	-	1.7
Making electronic payment to suppliers	**US**	69	21.6	40	12.5	87	27.2	97	30.3	27	8.4	2.92
	Egypt	243	93.4	17	6.54	-	-	-	-	-	-	1.06
Allowing customers to access the company's inventories	**US**	123	38.4	44	13.8	49	15.3	90	28.1	14	4.4	2.46
	Egypt	165	63	70	26.9	25	9.6	-	-	-	-	1.52
Accessing customer's inventories	**US**	118	36.9	42	13.1	60	18.8	81	25.3	19	5.9	2.50
	Egypt	249	95.7	11	4.2	-	-	-	-	-	-	1.04
Allowing suppliers to access the company's inventories	**US**	130	40.6	41	12.8	45	14.1	89	27.8	15	4.7	2.43
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Accessing supplier's inventories	**US**	109	34.1	47	14.7	63	19.7	83	25.9	18	5.6	2.54
	Egypt	165	63	70	26.9	25	9.6	-	-	-	-	1.52
Selling products/services by	**US**	153	47.8	32	10.0	40	12.5	82	25.6	13	4.1	2.28

electronic auction	**Egypt**	260	100	-	-	-	-	-	-	-	-	1
Selling products/services by responding to electronic calls for tenders	**US**	135	42.2	31	9.7	51	15.9	83	25.9	20	6.3	2.44
	Egypt	165	63	70	26.9	25	9.6	-	-	-	-	1.5
Negotiating contracts (price, volume, etc.) with customers	**US**	71	22.2	34	10.6	70	21.9	111	34.7	34	10.6	3.01
	Egypt	200	76	43	16.5	17	6.54	-	-	-	-	1.29
Receiving electronic payments from customers	**US**	58	18.1	43	13.4	88	27.5	100	31.3	31	9.7	3.01
	Egypt	127	48.8	104	40	29	11.15	-	-	-	-	1.62

in general, on level 4 of adoption, the average of the US manufacturing SMEs` responses ranged from 'A little' (2.44) on 'Automating the production floor using manufacturing execution system (MES)' to 'About Average' (2.99) on 'Transferring documents and technical drawing to customers`. On the other hand, on adoption level 4, the average of the Egyptian manufacturing SMEs' responses ranged from 'Not at all' (1) on 'Automating the production floor using manufacturing execution system (MES)' to 'A little' (1.62) on 'Optimizing returns management (``reverse logistics``)`.These responses revealed that the Egyptian SMEs adopted one process of B2B e-commerce; this is returns management. On the other hand, in adopting level 4 of B2B e-commerce, the American manufacturing SMEs implemented all eBPs. Table 5-4 shows the descriptive statistics of the American and Egyptian manufacturing SMEs adopting level 4 of B2B e-commerce. These responses of Egyptian manufacturing SMEs are further justification that they adopt a very low level of B2B e-commerce.

Table 5-4: Descriptive statistics of level 4 of adoption

Level 4	**Contexts**	**Not at all**		**A little**		**About Average**		**A Lot**		**Totally**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Transferring documents and technical drawing to customers	**US**	63	19.7	44	13.8	76	23.8	106	33.1	31	9.7	2.99
	Egypt	249	95.7	11	4.2	-	-	-	-	-	-	1.04

Transferring documents and technical drawing to suppliers	**US**	77	24.1	42	13.1	75	23.4	95	29.7	31	9.7	2.88
	Egypt	249	95.7	11	4.2	-	-	-	-	-	-	1.04
Integrating software supporting product design (e.g. CAD/ CAM, VPDM, PDM)	**US**	88	27.5	38	11.9	72	22.5	93	29.1	29	9.1	2.80
	Egypt	243	93.4	17	6.54	-	-	-	-	-	-	1.06
Doing collaborative on-line engineering with suppliers	**US**	105	32.8	44	13.8	69	21.6	85	26.6	17	5.3	2.58
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Doing collaborative on-line engineering with customers	**US**	103	32.2	43	13.4	65	20.3	92	28.8	17	5.3	2.62
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Automating the production floor using manufacturing execution system (MES)	**US**	132	41.3	33	10.3	58	18.1	76	23.8	21	6.6	2.44
	Egypt	260		-	-	-	-	-	-	-	-	1
Integrating the MES into the management information system	**US**	127	39.7	39	12.2	54	16.9	76	23.8	24	7.5	2.47
	Egypt	260		-	-	-	-	-	-	-	-	1
Ensuring the management of quality assurance using the management information system	**US**	98	30.6	42	13.1	69	21.6	88	27.5	23	7.2	2.68
	Egypt	260		-	-	-	-	-	-	-	-	1
Automating distribution/ logistics using a logistics execution system (LES)	**US**	127	39.7	36	11.3	60	18.8	80	25.0	17	5.3	2.45
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Allowing distribution/ transportation partners to access the information they need (SKU, quantity turnaround , etc.) in order to reduce time and costs related to distribution	**US**	122	38.1	39	12.2	64	20.0	80	25.0	15	4.7	2.46
	Egypt	260	100	-	-	-	-	-	-	-	-	1
Optimizing returns management (``reverse logistics``)	**US**	116	36.3	50	15.6	56	17.5	83	25.9	15	4.7	2.47
	Egypt	127	48.8	104	40	29	11.15	-	-	-	-	1.62
Tracking products (purchased and sold) during transportation	**US**	70	21.9	41	12.8	76	23.8	103	32.2	30	9.4	2.94
	Egypt	260	100	-	-	-	-	-	-	-	-	1

5.3.2 Factors affecting B2B e-commerce adoption

5.3.2.1 Technological factors

In terms of the relative advantage, the American manufacturing SMEs agreed mostly (3.6) on 'Using B2B e-commerce would enable my company to accomplish specific task more quickly' and (3.8) on 'Using B2B e-commerce in my job would increase my productivity'. Also, the Egyptian manufacturing SMEs agreed mostly (3.52) on 'using B2B e-commerce would enhance my effectiveness on the job' to (3.7) on 'Using B2B

e-commerce would improve my job performance'. These responses justify the American and Egyptian SMEs' adoption of B2B e-commerce since they believed that they would benefit from B2B e-commerce. Table 5-5 shows the descriptive statistics of relative advantage of the American SMEs adopting B2B e-commerce versus the adoption by Egyptian manufacturing SMEs.

Table 5-5: Descriptive statistics of relative advantage

Relative Advantage	Contexts	SD		D		N		A		SA		Mean
		F	%	F	%	F	%	F	%	F	%	
Using B2B e-commerce would enable my company to accomplish specific task more quickly	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6	3.6
	Egypt	32	12.3	10	3.8	30	11.5	159	61	29	11.15	3.55
Using B2B e-commerce would improve my job performance	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6	3.6
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.7
Using B2B e-commerce in my job would increase my productivity	**US**	25	7.8	24	9	36	11	147	46	88	27	3.8
	Egypt	14	5.38	18	6.9	30	11.5	170	65.3	28	10.7	3.66
using B2B e-commerce would enhance my effectiveness on the job	**US**	25	7.8	24	9	36	11	147	46	88	27	3.8
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52
using B2B e-commerce would make it easier to do my job	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6	3.6
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.7
I would find B2B e-commerce useful in my job	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6	3.6
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.7

For Compatibility, Table 5-6 displays that the American manufacturing SMEs' opinions ranged from 'Neutral' (3.13) on 'Using B2B e-commerce is consistent with our company`s culture' to (3.19) on 'Using a B2B e-commerce is compatible with all aspects of our work`. On average, Egyptian manufacturing SMES have 'Neutral' (2.58) opinions on 'Attitudes towards B2B e-commerce adoption in our company

have been favourable' to (3.03) on 'B2B e-commerce adoption is consistent with our business strategy'.

Table 5-6: Descriptive statistics of compatibility

Compatibility	Contexts	SD		D		N		A		SA		Mean
		F	%	F	%	F	%	F	%	F	%	
Using a B2B e-commerce is compatible with all aspects of our work	**US**	46	14.4	30	9.4	126	39.4	53	16.6	65	20.3	3.19
	Egypt	86	33	31	11.9	30	11.5	113	43.4	-	-	2.65
Using B2B e-commerce is consistent with our company`s culture	**US**	47	14.7	35	10.9	131	40.9	45	14.1	62	19.4	3.13
	Egypt	86	33	31	11.9	30	11.5	113	43.4	-	-	2.65
Attitudes towards B2B e-commerce adoption in our company have been favourable	**US**	45	14.1	37	11.6	131	40.9	38	11.9	69	21.6	3.15
	Egypt	31	11.9	80	30	113	43.4	36	13.8	-	-	2.58
B2B e-commerce adoption is compatible with our information technology infrastructure	**US**	45	14.1	32	10.0	132	41.3	41	12.8	70	21.9	3.18
	Egypt	16	6.15	64	24.6	77	29.6	100	38.46	3	1.15	3.03
B2B e-commerce adoption is consistent with our business strategy	**US**	48	15.0	31	9.7	132	41.3	41	12.8	68	21.3	3.16
	Egypt	16	6.15	64	24.6	77	29.6	100	38.46	3	1.15	3.03

In terms of complexity, Table 5-7 shows that American manufacturing SMEs' opinions ranged from 'Neutral' (3.17) on 'The skills required to use B2B e-commerce are too complex for our employees' to (3.31) on 'I believe that B2B e-commerce is cumbersome to use'. On average, Egyptian manufacturing SMEs have 'Neutral' (2.80) opinions on 'Using B2B e-commerce is often frustrating' to (2.93) on 'Integrating these technologies in our current work practices will be very difficult'.

Table 5-7: Descriptive statistics of complexity

Complexity	Contexts	SD		D		N		A		SA		Mean
		F	%	F	%	F	%	F	%	F	%	
The skills required to use B2B e-commerce are too complex for our employees	**US**	45	14.1	29	9.1	137	42.8	46	14.4	63	19.7	3.17
	Egypt	82	31.5	1	.38	61	23.4	110	42.3	6	2.3	2.83

Integrating these technologies in our current work practices will be very difficult	**US**	42	13.1	36	11.3	130	40.6	47	14.7	65	20.3	3.18
	Egypt	46	17.6	40	15.3	60	23	114	43.8	-	-	2.93
I believe that B2B e-commerce is cumbersome to use	**US**	33	10.3	32	10.0	129	40.3	54	16.9	72	22.5	3.31
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80
Using B2B e-commerce is often frustrating	**US**	38	11.9	31	9.7	137	42.8	45	14.1	69	21.6	3.24
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80

5.3.2.2 Organisational factors

Generally, the American manufacturing SMEs' average responses on top management support is 'Agree' (3.6) on 'The owner/manager is interested in the adoption of the B2B e-commerce' to (4.08) on 'The owner/manager desires to project the company as a leader in the use of new technologies'. On the other hand, the Egyptian manufacturing SMEs' average responses is 'Neutral' (2.80) on 'The owner/manager has allocated adequate resources to adoption of B2B e-commerce' to (3.03) on 'The owner/manager desires to project the company as a leader in the use of new technologies'. These responses justify the conclusion that compared to the owners/managers of Egyptian manufacturing SMEs; the owners/managers of American manufacturing SMEs are more supportive to adopting B2B e-commerce. Table 5-8 shows the descriptive statistics of top management support.

Table 5-8: Descriptive statistics of top management support

Top management support	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
The owner/manager is interested in the adoption of the B2B e-commerce	**US**	33	10.3	29	9.1	44	13.8	146	45.6	68	21.3	3.6
	Egypt	46	17.6	40	15.3	60	23	114	43.8	-	-	2.93
The owner/manager considers B2B e-commerce adoption is important to the company	**US**	33	10.3	29	9.1	44	13.8	146	45.6	68	21.3	3.6
	Egypt	46	17.6	40	15.3	60	23	114	43.8	-	-	2.93

The owner/manager has effectively communicated its support for B2B e-commerce adoption	**US**	20	6.25	20	6.25	45	14	163	50	72	22.5	3.8
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80
The owner/manager has allocated adequate resources to adoption of B2B e-commerce	**US**	20	6.2	20	6.25	45	14	163	50	72	22.5	3.8
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80
The owner/manager actively encourages employees to use the new technologies in their daily tasks	**US**	20	6.2	26	8.1	20	6.25	154	48.1	100	31.2	4
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80
The owner/manager is committed to the use of the B2B e-commerce	**US**	20	6.25	26	8.1	20	6.25	154	48.1	100	31.2	4
	Egypt	79	30	22	8.4	30	11.5	129	49.6	-	-	2.80
The owner/manager desires to project the company as a leader in the use of new technologies	**US**	5	1.5	26	8.1	20	6.25	154	48.1	115	35.9	4.08
	Egypt	16	6.15	64	24.6	77	29.6	100	38.46	3	1.15	3.03

5.3.2.3 Environmental factors

In terms of the competitive pressure, the American manufacturing SMEs' responses ranged from 'Neutral' (2.99) on 'We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce' to 'Agree' (3.5) on 'We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace'. On the other hand, the Egyptian manufacturing SMEs agreed mostly (3.51) on 'We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace' to (4.04) on 'Our competitors in market drive our company to use B2B e-commerce'. Table 5-9 shows the descriptive statistics of competitive pressure for both American and Egyptian manufacturing SMEs. These Egyptian manufacturing SMEs' responses are further justification of the belief that the competitive pressures push manufacturing SMEs to adopt B2B e-commerce.

Table 5-9: Descriptive statistics of competitive pressure

Competitive pressure	Contexts	SD		D		N		A		SA		Mean
		F	%	F	%	F	%	F	%	F	%	
We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce	**US**	65	20.3	38	11.9	114	35.6	41	12.8	62	19.4	2.99
	Egypt	14	5.3	14	5.3	50	19.2	158	60.7	24	9.2	3.7
We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace	**US**	55	17.2	35	10.9	36	11.3	121	37.8	73	22.8	3.5
	Egypt			53	20.3	42	16	147	56.5	18	6.9	3.51
Our competitors in market drive our company to use B2B e-commerce	**US**	56	17.5	42	13.1	124	38.8	30	9.4	68	21.3	3.04
	Egypt	13	5	5	1.9	-	-	181	69	61	23.4	4.04

For business partner pressure, the American manufacturing SMEs agree mostly (3.6) on 'Our suppliers demand us to use B2B e-commerce for doing business with them' to (3.8) on 'Our suppliers are using B2B e-commerce' On the other hand, the Egyptian manufacturing SMEs responses ranged from 'Disagree' (1.83) on 'Our customers are using B2B e-commerce' to 'Neutral' (2.7) on 'Our suppliers demand us to use B2B e-commerce for doing business with them'. Table 5-10 displays the descriptive statistics of business partner pressure for both American and Egyptian manufacturing SMEs. These responses of US manufacturing SMEs are further justification of the belief that, in the USA, the business partner pressures push manufacturing SMEs to adopt B2B e-commerce. On the other hand, the Egyptian manufacturing SMEs' responses are justification of the non-belief that the business partner pressures push them to adopt B2B e-commerce.

Table 5-10: Descriptive statistics of business partner pressure

Business partner pressure	Contexts	SD		D		N		A		SA		Mean
		F	%	F	%	F	%	F	%	F	%	
Our suppliers demand us to use	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6	3.6

B2B e-commerce for doing business with them														
	Egypt	91	35	11	4.2	50	19.2	108	41.5	-	-			2.7
our customers demand us to use B2B e-commerce for doing business with them	**US**	36	11.3	18	5.6	50	15.6	147	45.9	69	21.6			3.6
	Egypt	139	53.4	61	23.4	23	8.8	37	14.2	-	-			1.83
Our suppliers are using B2B e-commerce	**US**	25	7.8	24	9	36	11	147	46	88	27			3.8
	Egypt	91	35	11	4.2	50	19.2	108	41.5	-	-			2.7
Our customers are using B2B e-commerce	**US**	25	7.8	24	9	36	11	147	46	88	27			3.8
	Egypt	139	53.4	61	23.4	23	8.8	37	14.2	-	-			1.83

In general, the average American SMEs' responses on government support is 'Agree' (**3.5**) on 'The government often informs us about the good points of B2B e-commerce' to (4.08) on 'The government plays an important role in promoting B2B e-commerce in SMEs'. On the other hand, the average Egyptian manufacturing SMEs' responses ranged from 'Disagree' (1.27) on 'The government provides incentives to using B2B e-commerce in SMEs' to (2) on 'Support from government is important to encourage us to use more of the B2B e-commerce in business'. These responses explain why owners/managers of Egyptian manufacturing SMEs have negative attitudes towards adopting an advance level of B2B e-commerce. Table 5-11 shows the descriptive statistics of government support.

Table 5-11: Descriptive statistics of government support

Government support	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
The government plays an important role in promoting B2B e-commerce in SMEs	**US**	5	1.5	26	8.1	20	6.25	154	48.1	115	35.9	4.08
	Egypt	188	72.3	72	27.6	-	-	-	-	-	-	1.27
The government provides incentives to using B2B e-commerce in SMEs	**US**	5	1.5	26	8.1	20	6.25	154	48.1	115	35.9	4.08
	Egypt	188	72.3	72	27.6	-	-	-	-	-	-	1.27

Business laws support electronic business	**US**	33	10.3	35	10.9	41	12.8	141	44.1	70	21.9	3.6
	Egypt	188	72.3	72	27.6	-	-	-	-	-	-	1.27
The government is helping in giving all kinds of assistance to help small business to use B2B e-commerce	**US**	5	1.5	26	8.1	20	6.25	154	48.1	115	35.9	4.08
	Egypt	188	72.3	72	27.6	-	-	-	-	-	-	1.27
The government often informs us about the good points of B2B e-commerce	**US**	59	18.4	50	15.6	32	10.0	113	35.3	66	20.6	**3.5**
	Egypt	60	23	200	76.9	-	-	-	-	-	-	1.7
Support from government is important to encourage us to use more of the B2B e-commerce in business	**US**	-	-	15	4.6	34	10.6	149	46.5	122	38	4.2
	Egypt	23	8.8	197	75.7	40	15.3	-	-	-	-	2

5.3.3 Competitive advantage

Generally, the average American manufacturing SMEs' responses on cost reduction is 'Agree' (3.6) on 'Reducing operational costs' to (4) on 'Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)'. On the other hand, the average Egyptian manufacturing SMEs' responses is also, 'Agree' (3.50) on 'Reducing customer support costs' to (4) on 'Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)'. These responses indicate that the American and Egyptian manufacturing SMEs are believed that using internet and relative technology reduce cost. Table 5-12 shows the descriptive statistics of cost reduction.

Table 5-12: Descriptive statistics of cost reduction

Cost reduction	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)	**US**	-	-	13	4.06	71	22	137	42.8	99	30.9	4
	Egypt	5	1.9	20	7.6	17	6.5	165	63	53	20	4
Reducing inventory costs	**US**	27	8.4	31	9.7	57	17.8	130	40.6	75	23.4	3.7
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.6250
Reducing operational costs	**US**	28	8.8	27	8.4	65	20.3	125	39.1	75	23.4	3.6
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52

Reducing costs of marketing, advertisement and sale of products/ services	**US**	23	7.2	28	8.8	58	18.1	136	42.5	75	23.4	3.7
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.6250
Reducing transaction costs	**US**	22	6.9	35	10.9	56	17.5	128	40.0	79	24.7	3.64
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52
Reducing coordination costs	**US**	26	8.1	31	9.7	55	17.2	136	42.5	72	22.5	3.61
	Egypt	11	4.2	1 5	5.7	94	36	110	42	30	12	3.50
Reducing customer support costs	**US**	26	8.1	33	10.3	55	17.2	133	41.6	73	22.8	3.60
	Egypt	11	4.2	1 5	5.7	94	36	110	42	30	12	3.50
Reducing document processing costs (e.g.: costs of document storage and manipulation, etc.)	**US**	23	7.2	29	9.1	70	21.9	124	38.8	74	23.1	3.62
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52
Reducing document publication costs (e.g.: costs of catalogues and brochures publishing)	**US**	25	7.8	25	7.8	67	20.9	127	39	76	23.8	3.64
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54

In terms of the differentiation, American manufacturing SMEs mostly agreed (3.6) on 'Providing new products/services to customers' to (3.8) on 'Providing easier customer access to information'. Also, the Egyptian manufacturing SMEs, agreed mostly (3.50) on 'Increasing ability for customers to customize products and services' to (3.71) on 'Enhancing the credibility and prestige of the organisation'. These responses justify the conclusion that adoption of B2B e-commerce provides differentiation benefit to American manufacturing SMEs and to Egyptian manufacturing SMEs. Table 5-13 shows the descriptive statistics of differentiation.

Table 5-13: Descriptive statistics of differentiation

Differentiation	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Providing new products/services to customers	**US**	30	9.4	30	9.4	61	19.1	128	40.0	71	22.2	3.6
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52
Providing better products/services to customers	**US**	28	8.8	32	10.0	53	16.6	134	41.9	73	22.8	3.61
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54

Providing easier customer access to information	**US**	13	4.1	25	7.8	78	24.4	128	40.0	76	23.8	3.8
	Egypt	12	4.6	16	6.15	35	13.4	167	64	30	11.5	3.6250
Speeding up transactions	**US**	13	4.1	23	7.2	73	22.8	136	42.5	75	23.4	3.74
	Egypt	11	4.2	1 5	5.7	94	36	106	41	34	13	3.52
Enhancing the credibility and prestige of the organisation	**US**	26	8.1	24	7.5	53	16.6	142	44.4	75	23.4	3.68
	Egypt	12	4.6	16	6.15	30	11.5	167	64	35	13.4	3.71
Increasing ability for customers to customize products and services	**US**	25	7.8	25	7.8	47	14.7	146	45.6	77	24.1	3.699
	Egypt	11	4.2	1 5	5.7	94	36	110	42	30	12	3.50
Enhancing brand distinguishability	**US**	23	7.2	29	9.1	56	17.5	140	43.8	72	22.5	3.65
	Egypt	11	4.2	1 5	5.7	94	36	110	42	30	12	3.50

For growth, Table 5-14 shows that American manufacturing SMEs' opinions ranged from 'Agree' (3.66) on 'Better achieve organisation goals' to (3.89) on 'Increasing customer satisfaction'. On the other hand, Egyptian SMEs have, on average, opinions of 'Agree' (3.51) on 'Better achieve organisation goals' to (3.71) on 'Increasing market share'. These responses justify the conclusion that the implementations of B2B e-commerce help both American and Egyptian manufacturing SMEs to grow their businesses.

Table 5-14: Descriptive statistics of growth

Growth	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Enhancing business efficiency	**US**	22	6.9	21	6.6	67	20.9	134	41.9	76	23.8	3.69
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54
Better achieve organisation goals	**US**	22	6.9	24	7.5	66	20.6	135	42.2	73	22.8	3.66
	Egypt	11	4.2	1 5	5.7	94	36	110	42	30	12	3.51
Increasing market share	**US**	26	8.1	27	8.4	52	16.3	142	44.4	73	22.8	3.7
	Egypt	12	4.6	16	6.15	30	11.5	167	64	35	13.4	3.71
Increasing sales	**US**	24	7.5	18	5.6	56	17.5	148	46.3	74	23.1	3.72
	Egypt	12	4.6	16	6.15	30	11.5	167	64	35	13.4	3.71
Increasing revenue	**US**	24	7.5	18	5.6	63	19.7	137	42.8	78	24.4	3.71
	Egypt	12	4.6	16	6.15	30	11.5	167	64	35	13.4	3.71
Increasing customer satisfaction	**US**	22	6.9	16	5.0	59	18.4	142	44.4	81	25.3	3.89
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54

Entering new markets	**US**	24	7.5	19	5.9	60	18.8	140	43.8	77	24.1	3.71
	Egypt	11	4.2	16	6.15	30	11.5	167	64	36	13.8	3.69

In terms of quality, American manufacturing SMEs agreed mostly (3.6) on 'Fast delivery' to (3.73) on 'Reducing transactions errors'. Also, Egyptian manufacturing SMEs agreed mostly (3.54) on 'Increasing quality of relation with business partners' to (3.69) on 'Increasing information quality'. These responses indicate that the adoption of B2B e-commerce provides quality benefits to both American and Egyptian SMEs. Table 5-15 shows the descriptive statistics of quality.

Table 5-15: Descriptive statistics of quality

Quality	**Contexts**	**SD**		**D**		**N**		**A**		**SA**		**Mean**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
Increasing quality of customer service (e.g. quick responses to customer inquiries, promptly follow- up customer claims and complaints, etc.)	**US**	24	7.5	23	7.2	72	22.5	132	41.3	69	21.6	3.61
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54
Fast delivery	**US**	25	7.8	29	9.1	68	21.3	130	40.6	68	21.3	3.6
	Egypt	11	4.2	16	6.15	30	11.5	167	64	36	13.8	3.69
Increasing products /services quality	**US**	31	9.7	29	9.1	57	17.8	132	41.3	71	22.2	3.6
	Egypt	11	4.2	16	6.15	30	11.5	167	64	36	13.8	3.69
Increasing information quality	**US**	22	6.9	18	5.6	70	21.9	136	42.5	74	23.1	3.72
	Egypt	11	4.2	16	6.15	30	11.5	167	64	36	13.8	3.69
Reducing transactions errors	**US**	19	5.9	22	6.9	61	19.1	141	44.1	77	24.1	3.73
	Egypt	11	4.2	16	6.15	30	11.5	167	64	36	13.8	3.69
Increasing quality of relation with business partners	**US**	21	6.6	21	6.6	61	19.1	143	44.7	74	23.1	3.71
	Egypt	11	4.2	1 5	5.7	88	33.8	112	43	34	13	3.54

5.4 Non-response bias

The main aim in assessing non-response bias is to determine the extent to which the respondents to the questionnaire survey are different from the non – respondents (Dillman, 2000). Armstrong and Overton (1977) stated that the non-response bias converses to the ability to generalize the study results to the entire population of study. Late respondents were used as surrogates for non-respondents (i.e.,Armstrong and Overton, 1977, Mahaney and Lederer, 2006) to examine non-response bias.

Armstrong and Terry (1977) concluded that, compared to those who responded to the questionnaire survey earlier, participants, who answering later, could be supposed to be more similar to non- respondents. In order to reveal non-response bias, the researcher conducted a t-test to check if the early respondents are (statistically) significantly different from the late respondents (i.e.,Mahaney and Lederer, 2006).

-USA context

In order to investigate any differences, the researcher compared the first fifty responses with the last fifty responses. To compare the early respondents and late respondents, t-test analysis was conducted. The t-test's null hypothesis is that there is no variation between the means of the early respondents and late respondents. Table 5-16 demonstrates that, for all items (which were selected randomly) the t-test was insignificant with P> 0.05 (see Appendix 3). This means the acceptance of

the null hypothesis and we could conclude that there is no difference between the early respondents and late respondents.

Table 5-16: Independent Samples Test: USA context

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
LevelA1	Equal variances assumed	.916	98	.362	.22000	.24022	.25671	.69671
	Equal variances not assumed	.916	97.716	.362	.22000	.24022	.25673	.69673
levelA2	Equal variances assumed	1.454	98	.149	.32000	.22002	.11662	.75662
	Equal variances not assumed	1.454	97.158	.149	.32000	.22002	.11667	.75667
levelA4	Equal variances assumed	1.854	98	.067	.44000	.23726	.03084	.91084
	Equal variances not assumed	1.854	97.810	.067	.44000	.23726	.03085	.91085
levelB2	Equal variances assumed	1.205	98	.231	.30000	.24897	.19406	.79406
	Equal variances not assumed	1.205	96.627	.231	.30000	.24897	.19415	.79415
levelB3	Equal variances assumed	.799	98	.426	.20000	.25035	.29682	.69682
	Equal variances not assumed	.799	97.920	.426	.20000	.25035	.29683	.69683
levelB5	Equal variances assumed	.815	98	.417	.20000	.24532	.28682	.68682
	Equal variances not assumed	.815	95.711	.417	.20000	.24532	.28697	.68697
levelC3	Equal variances assumed	1.456	98	.149	.38000	.26100	.13795	.89795
	Equal variances not assumed	1.456	97.467	.149	.38000	.26100	.13799	.89799
levelC8	Equal variances assumed	1.703	98	.092	.42000	.24659	.06936	.90936
	Equal variances not assumed	1.703	98.000	.092	.42000	.24659	.06936	.90936
levelC11	Equal variances assumed	.528	98	.599	.14000	.26528	.38645	.66645
	Equal variances not assumed	.528	94.622	.599	.14000	.26528	.38668	.66668
levelD1	Equal variances assumed	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed	1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD12	Equal variances assumed	1.279	98	.204	.32000	.25026	.17663	.81663
	Equal variances not assumed	1.279	97.552	.204	.32000	.25026	.17666	.81666
relative5	Equal variances assumed	1.644	98	.103	.34000	.20684	.07047	.75047
	Equal variances not assumed	1.644	91.112	.104	.34000	.20684	.07086	.75086
relative6	Equal variances assumed	1.806	98	.074	.38000	.21044	.03761	.79761
	Equal variances not assumed	1.806	91.271	.074	.38000	.21044	.03800	.79800
compati.5	Equal variances assumed	1.789	98	.087	.38000	.21237	.04145	.80145
	Equal variances not assumed	1.789	93.773	.087	.38000	.21237	.04168	.80168

complex.2	Equal variances assumed	1.070	98	.287	.22000	.20558	.18796	.62796
	Equal variances not assumed	1.070	94.372	.287	.22000	.20558	.18815	.62815
complex.4	Equal variances assumed	.607	98	.545	.12000	.19754	.27200	.51200
	Equal variances not assumed	.607	92.080	.545	.12000	.19754	.27232	.51232
topM.1	Equal variances assumed	.539	98	.591	.10000	.18545	.26802	.46802
	Equal variances not assumed	.539	91.904	.591	.10000	.18545	.26833	.46833
topM.5	Equal variances assumed	1.743	98	.084	.34000	.19506	.04709	.72709
	Equal variances not assumed	1.743	97.913	.084	.34000	.19506	.04710	.72710
topM.7	Equal variances assumed	1.295	98	.198	.28000	.21628	.14919	.70919
	Equal variances not assumed	1.295	92.715	.199	.28000	.21628	.14950	.70950
government.1	Equal variances assumed	1.489	98	.140	.30000	.20148	.09984	.69984
	Equal variances not assumed	1.489	92.984	.140	.30000	.20148	.10011	.70011
government.4	Equal variances assumed	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed	1.580	89.173	.118	.32000	.20247	.08230	.72230
costredu.8	Equal variances assumed	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed	1.883	97.489	.083	.36000	.19115	.01936	.73936
costredu.9	Equal variances assumed	1.320	98	.190	.26000	.19698	.13089	.65089
	Equal variances not assumed	1.320	97.719	.190	.26000	.19698	.13091	.65091
differe.3	Equal variances assumed	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed	1.476	97.815	.143	.28000	.18974	.09654	.65654
differe.6	Equal variances assumed	2.101	98	.088	.38000	.18090	.02100	.73900
	Equal variances not assumed	2.101	95.557	.088	.38000	.18090	.02089	.73911
growth5	Equal variances assumed	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed	1.580	89.173	.118	.32000	.20247	.08230	.72230
growth7	Equal variances assumed	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed	1.883	97.489	.083	.36000	.19115	.01936	.73936
quality1	Equal variances assumed	.539	98	.591	.10000	.18545	.26802	.46802
	Equal variances not assumed	.539	91.904	.591	.10000	.18545	.26833	.46833
quality6	Equal variances assumed	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed	1.476	97.815	.143	.28000	.18974	.09654	.65654

-Egyptian context

The first fifty responses were compared to the last fifty responses to investigate any differences. The researcher conducted a t-test for the Egyptian sample. The findings reveal that the t-test's p values were insignificant. This means that we could accept

the null hypothesis that there is no difference between early and late responses and, therefore, non-response bias is not an issue (see Table 5-17 and Appendix 4).

Table 5-17: Independent Samples Test: Egyptian context

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
LevelA1	Equal variances assumed	.679	98	.499	.100	.147	.392	.192
	Equal variances not assumed	.679	88.014	.499	.100	.147	.393	.193
LevelA3	Equal variances assumed	1.649	98	.102	.260	.158	.573	.053
	Equal variances not assumed	1.649	72.059	.103	.260	.158	.574	.054
LevelA4	Equal variances assumed	1.651	98	.102	.160	.097	.352	.032
	Equal variances not assumed	1.651	53.353	.105	.160	.097	.354	.034
levelB1	Equal variances assumed	.516	98	.607	.080	.155	.388	.228
	Equal variances not assumed	.516	84.419	.607	.080	.155	.388	.228
levelB5	Equal variances assumed	.725	98	.470	.100	.138	.374	.174
	Equal variances not assumed	.725	81.884	.471	.100	.138	.375	.175
levelB7	Equal variances assumed	1.559	98	.122	.280	.180	.637	.077
	Equal variances not assumed	1.559	82.771	.123	.280	.180	.637	.077
levelC1	Equal variances assumed	1.692	98	.094	.240	.142	.522	.042
	Equal variances not assumed	1.692	73.700	.095	.240	.142	.523	.043
levelC5	Equal variances assumed	1.177	98	.242	.240	.204	.165	.645
	Equal variances not assumed	1.177	93.607	.242	.240	.204	.165	.645
levelC8	Equal variances assumed	1.235	98	.220	.220	.178	.134	.574
	Equal variances not assumed	1.235	93.642	.220	.220	.178	.134	.574
levelD1	Equal variances assumed	.476	98	.635	.060	.126	.310	.190
	Equal variances not assumed	.476	90.670	.635	.060	.126	.310	.190
levelD4	Equal variances assumed	1.016	98	.312	.080	.079	.236	.076
	Equal variances not assumed	1.016	79.387	.313	.080	.079	.237	.077
levelD6	Equal variances assumed	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed	.850	95.836	.398	.100	.118	.334	.134
relative1	Equal variances assumed	.632	98	.529	.140	.222	.300	.580
	Equal variances not assumed	.632	97.050	.529	.140	.222	.300	.580
relative4	Equal variances assumed	.336	98	.738	.040	.119	.277	.197
	Equal variances not assumed	.336	90.303	.738	.040	.119	.277	.197

relative5	Equal variances assumed	1.260	98	.211	.140	.111	.081	.361
	Equal variances not assumed	1.260	97.819	.211	.140	.111	.081	.361
compati.2	Equal variances assumed	.513	98	.609	.100	.195	.487	.287
	Equal variances not assumed	.513	95.421	.609	.100	.195	.487	.287
compati.3	Equal variances assumed	.933	98	.353	.140	.150	.438	.158
	Equal variances not assumed	.933	87.410	.354	.140	.150	.438	.158
complex.1	Equal variances assumed	1.434	98	.155	.440	.307	.169	1.049
	Equal variances not assumed	1.434	97.909	.155	.440	.307	.169	1.049
topM.2	Equal variances assumed	.755	98	.452	.240	.318	.391	.871
	Equal variances not assumed	.755	97.853	.452	.240	.318	.391	.871
topM.5	Equal variances assumed	1.000	98	.320	.040	.040	.039	.119
	Equal variances not assumed	1.000	49.000	.322	.040	.040	.040	.120
topM.6	Equal variances assumed	.672	98	.503	.180	.268	.352	.712
	Equal variances not assumed	.672	97.854	.503	.180	.268	.352	.712
competiti	Equal variances assumed	1.644	98	.103	.280	.170	.618	.058
ve p. 1	Equal variances not assumed	1.644	83.503	.104	.280	.170	.619	.059
business	Equal variances assumed	.223	98	.824	.060	.269	.594	.474
p.p. 1	Equal variances not assumed	.223	97.947	.824	.060	.269	.594	.474
governme	Equal variances assumed	.643	98	.521	.080	.124	.167	.327
nt.4	Equal variances not assumed	.643	87.844	.522	.080	.124	.167	.327
governme	Equal variances assumed	.147	98	.883	.020	.136	.250	.290
nt.5	Equal variances not assumed	.147	92.785	.883	.020	.136	.250	.290
costredu.	Equal variances assumed	1.281	98	.203	.280	.219	.714	.154
3	Equal variances not assumed	1.281	81.895	.204	.280	.219	.715	.155
costredu.	Equal variances assumed	.542	98	.589	.060	.111	.160	.280
5	Equal variances not assumed	.542	97.044	.589	.060	.111	.160	.280
costredu.	Equal variances assumed	.775	98	.440	.080	.103	.285	.125
7	Equal variances not assumed	.775	85.263	.440	.080	.103	.285	.125
differe.2	Equal variances assumed	.761	98	.448	.200	.263	.721	.321
	Equal variances not assumed	.761	96.951	.448	.200	.263	.722	.322
differe.4	Equal variances assumed	.827	98	.410	.060	.073	.084	.204
	Equal variances not assumed	.827	57.003	.412	.060	.073	.085	.205
growth2	Equal variances assumed	.299	98	.766	.060	.201	.458	.338
	Equal variances not assumed	.299	95.984	.766	.060	.201	.458	.338
growth5	Equal variances assumed	.201	98	.841	.040	.199	.356	.436
	Equal variances not assumed	.201	97.999	.841	.040	.199	.356	.436
quality1	Equal variances assumed	.687	98	.494	.140	.204	.264	.544
	Equal variances not assumed	.687	94.607	.494	.140	.204	.264	.544
quality5	Equal variances assumed	.887	98	.377	.120	.135	.149	.389
	Equal variances not assumed	.887	94.308	.378	.120	.135	.149	.389

5.5 Structural equation model (SEM) results

The Structural Equation Model (SEM) is composed of two models: the measurement model; and the structural model (Garson, 2008, Gefen et al., 2000). The measurement model measures the relationships between the latent variables (unobserved variables) and indicators (observed variables). On the other hand, the structural model examines the causal relationships between the latent variables (unobserved variables) (Hox, 2010, Hair et al., 2010). The following sections describe the measurement and structural models.

5.5.1 Measurement model

The measurement model (outer model) examines the relationships between latent variables and their indicators (Hox, 2010, Hair et al., 2010). In other words, the measurement model shows how each set of items related to the construct (Hair et al., 2006). Before starting proceedings with the structural model (Brown, 2006), the measurement model ought to measure the validity and reliability of the constructs.

The measurement model comprise a test of the internal consistency reliability (Crobach's Alpha and composite reliability) and construct validity (convergent validity and discriminate validity) for latent variables; this refer to the strength of the scales used to test the suggested model (Fornell and Bookstein, 1982). In this study, the measurement model is tested in two phases since the model has both reflective and formative latent variables and this need dissimilar analysis processes.

5.5.1.1 Measurement model for reflective latent variables

Reliability is a measure of the quality of a measurement instrument; the instrument, itself, is typically a set of question-statements. A measurement instrument has good reliability if the question-statements (or other measures), associated with each latent variable, are understood in the same way by different respondents (Kock, 2012, p. 41). For reflective latent variables, the measurement model's reliability is assessed typically by Cronbach's α and composite reliability which should be equal to or greater than 0.7 (Fornell and Larcker, 1981, Kock, 2012).

Construct validity is defined `as the extent to which a set of measured items actually reflects the theoretical latent construct those items are designed to measure` (Hair et al., 2006, p. 776). In order to measure validity, the following two validity sub-types are tested: convergent validity; and discriminant validity (Henseler et al., 2009). Convergent validity is defined as the extent to which dissimilar measures of the same latent construct are harmonized with each other (Bryman and Cramer, 2012). The convergent validity can be assessed by an indicator loading associated with each latent variable. In this respect, the two suggested criteria are: the loadings are equal to or more than 0.5; and that the P values, associated with the loadings, be less than 0.05 (Hair et al., 2011). Latent variable indicators must be excluded for these standards which are not satisfied (Kock, 2012). Besides, convergent validity can be tested, also, by Average Variance Extracted (AVE). Convergent validity is satisfactory when latent variables have an Average Variance Extracted (AVE) of at least 0.5 (Hair et al., 2010).

Discriminant validity measures the extent to which a latent construct is actually different from other latent constructs (Hair et al., 2010). In addition, it is used to distinguish between the constructs which are expected to measure different phenomenon. Gaining proper discriminant validity, in a research study, implies that the constructs are, in fact, measuring different things (Kline, 2010). Discriminate validity is assessed typically by using the Square Root of the Average Variance Extracted (SQRT AVE), for acceptable discriminate validity. For each construct, the square root of the average variance extracted should be greater than any of the correlations involving that construct (Fornell and Larcker, 1981, Kock, 2012).

In this study, the measurement model was examined for the technological context (relative advantage, compatibility and complexity); organisational context (top management support and Firm size); and environmental context (competitive pressure, business partner pressure and government support), and competitive advantage (cost reduction, differentiation, growth and quality). These are conceived to be the reflective latent variables. Additionally, the measurement model was tested for both samples: USA and Egypt. The following two sections describe a detailed procedure for the evaluation of Reflective Measurement Models for the American and Egyptian contexts respectively.

5.5.1.1.1 Measurement model for reflective latent variables: USA context

As shown in Tables 5-18, in the American sample, the Cronbach's α and composite reliability for relative advantage, compatibility, complexity, top management support ,firm size , competitive pressure, business partner pressure, government support, cost reduction, differentiation, growth and quality were well above the recommended level of 0.7 as an indicator for satisfactory internal consistency reliability.

Table 5-18: Cronbach's α and composite reliability: USA context

Constructs (reflective)	***Cornbrash's α***	***CR****
Relative advantage	*0.96*	*0.98*
Compatibility	*0.96*	*0.97*
Complexity	*0.95*	*0.97*
Top management support	*0.95*	*0.96*
Firm size	*1.00*	*1.00*
Competitive pressure	*0.97*	*0.98*
Business partner pressure	*0.97*	*0.97*
Government support	*0.97*	*0.98*
Cost Reduction	*0.96*	*0.96*
Differentiation	*0.95*	*0.97*
Growth	*0.95*	*0.96*
Quality	*0.96*	*0.97*

CR: composite reliability

Furthermore, Table 5-19 illustrates the loadings and cross-loadings for the reflective indicators and their P-values. This study is followed Kock (2012), Hair et al. (2011) and Vinzi et al. (2010), who said that two criterion are recommended as bases for the conclusion that the model has acceptable convergent validity. These are that, for all constructs, the indicators loading ought to be equal to or more than 0.5 and, for

the technological context (relative advantage, compatibility and complexity), organisational context (top management support and firm size), environmental context (competitive pressure, business partner pressure and government support), the p values ought to be less than 0.05. The results show that three out of six for relative advantage; three out of five for compatibility; three out of four indicators for complexity; five out of seven indicators of top management support; all indicators for competitive pressure and for business partner pressure. Finally, four out of six indicators of government support are found to be significant and with loadings higher than 0.5 (Hair et al., 2011, Kock, 2012, Vinzi et al., 2010). Having regard to competitive advantage, the results reveal that four out of nine for cost reduction; three out of seven forms of differentiation; and three out of seven indicators of growth. Finally, three out of six indicators of quality are found to be significant and the loadings higher than 0.5 (Hair et al., 2011, Kock, 2012, Vinzi et al., 2010).

Table 5-19: Loading and cross-loading of indicators for American sample

	Rel	Com	Compl	Top	Fir	C.P.	P.P.	Gov	Cos	Dif	Gro	Qua	SE	P value
Rel.1	**(0.957)**	-0.317	-0.043	0.180	0.022	-0.075	0.176	-0.058	0.024	-0.137	0.163	-0.040	0.037	<0.001
Rel.4	**(0.971)**	0.117	-0.009	-0.126	-0.002	0.034	-0.011	0.047	-0.156	0.194	-0.103	0.027	0.029	<0.001
Rel.6	**(0.970)**	0.195	0.052	-0.052	-0.019	0.041	-0.163	0.010	0.132	-0.059	-0.058	0.012	0.033	<0.001
Com. 1	0.401	**(0.955)**	0.075	-0.271	-0.040	0.115	-0.156	-0.032	0.130	0.015	-0.045	-0.063	0.035	<0.001
Com.3	-0.310	**(0.968)**	-0.033	0.185	0.015	0.061	-0.062	0.035	-0.038	-0.143	0.023	0.165	0.032	<0.001
Com.5	-0.085	**(0.970)**	-0.041	0.082	0.025	-0.175	0.215	-0.002	-0.091	0.128	0.021	-0.103	0.031	<0.001
Compl.2	0.036	0.027	**(0.952)**	-0.139	-0.010	0.175	0.043	-0.053	-0.052	-0.148	-0.052	0.256	0.034	<0.001
Compl.3	0.056	-0.038	**(0.959)**	-0.159	0.030	-0.154	0.070	0.007	-0.025	0.090	0.359	-0.352	0.035	<0.001
Comp.l4	-0.092	0.011	**(0.952)**	0.299	-0.020	-0.020	-0.113	0.045	0.077	0.057	-0.309	0.098	0.035	<0.001
Top.1	0.022	-0.184	0.772	**(0.841)**	-0.063	-0.019	0.002	-0.136	0.010	-0.134	0.250	-0.235	0.046	<0.001
Top.3	0.206	-0.162	-0.143	**(0.943)**	0.068	0.255	0.271	-0.270	-0.012	0.033	-0.186	0.207	0.029	<0.001
Top.4	-0.244	0.172	-0.229	**(0.949)**	-0.024	0.080	0.232	0.040	-0.108	0.101	0.004	0.022	0.029	<0.001
Top.5	-0.147	0.131	-0.161	**(0.919)**	-0.019	-0.427	-0.152	0.151	0.357	0.096	-0.083	-0.171	0.032	<0.001
Top.7	0.166	0.026	-0.160	**(0.925)**	0.031	0.100	-0.364	0.207	-0.241	-0.111	0.041	0.152	0.035	<0.001
fir	-0.000	-0.000	-0.000	0.000	**(1.000)**	0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.022	<0.001
C.P.1	-0.068	0.047	0.116	-0.170	-0.034	**(0.966)**	-0.073	-0.006	-0.178	0.180	0.010	-0.068	0.029	<0.001
C.P.2	0.190	-0.151	-0.111	0.130	0.039	**(0.969)**	-0.040	-0.037	0.068	-0.024	0.020	-0.019	0.028	<0.001
C.P.3	-0.122	0.104	-0.005	0.040	-0.004	**(0.973)**	0.112	0.043	0.109	-0.155	-0.030	0.086	0.029	<0.001

P.P.1	*-0.306*	*0.226*	*-0.006*	*0.142*	*0.000*	*0.304*	***(0.962)***	*0.097*	*-0.100*	*-0.059*	*-0.037*	*0.113*	*0.030*	*<0.001*
P.P.2	*-0.083*	*0.071*	*0.008*	*-0.107*	*0.031*	*0.378*	***(0.957)***	*0.074*	*-0.171*	*-0.181*	*0.194*	*0.088*	*0.029*	*<0.001*
P.P.3	*0.353*	*-0.305*	*-0.069*	*0.080*	*-0.032*	*-0.376*	***(0.956)***	*-0.119*	*0.100*	*0.068*	*-0.094*	*-0.014*	*0.033*	*<0.001*
P.P.4	*0.038*	*0.006*	*0.067*	*-0.114*	*0.001*	*-0.306*	***(0.962)***	*-0.052*	*0.171*	*0.171*	*-0.063*	*-0.187*	*0.035*	*<0.001*
Gov.1	*-0.011*	*0.028*	*-0.046*	*0.021*	*-0.033*	*-0.092*	*0.014*	***(0.961)***	*0.051*	*-0.142*	*-0.060*	*0.103*	*0.033*	*<0.001*
Gov.2	*-0.134*	*0.017*	*0.032*	*-0.090*	*0.005*	*0.138*	*-0.108*	***(0.967)***	*0.107*	*-0.198*	*0.104*	*-0.022*	*0.030*	*<0.001*
Gov.3	*0.192*	*-0.149*	*0.082*	*0.143*	*0.045*	*-0.334*	*0.199*	***(0.936)***	*0.027*	*0.158*	*0.027*	*-0.087*	*0.040*	*<0.001*
Gov.5	*-0.041*	*0.102*	*-0.066*	*-0.071*	*-0.016*	*0.281*	*-0.099*	***(0.953)***	*-0.186*	*0.190*	*-0.071*	*0.003*	*0.028*	*<0.001*
Cos.1	*0.138*	*-0.054*	*0.059*	*-0.006*	*-0.015*	*-0.166*	*0.253*	*-0.266*	***(0.936)***	*-0.171*	*0.389*	*-0.479*	*0.039*	*<0.001*
Cos.2	*-0.119*	*0.102*	*-0.146*	*0.097*	*-0.020*	*0.083*	*-0.104*	*0.103*	***(0.946)***	*0.127*	*-0.311*	*0.147*	*0.033*	*<0.001*
Cos.4	*-0.013*	*0.064*	*0.093*	*-0.225*	*0.008*	*0.159*	*-0.230*	*0.143*	***(0.937)***	*0.199*	*0.344*	*-0.214*	*0.039*	*<0.001*
Cos.7	*-0.005*	*-0.112*	*-0.005*	*0.131*	*0.027*	*-0.077*	*0.081*	*0.018*	***(0.945)***	*-0.155*	*-0.415*	*0.540*	*0.034*	*<0.001*
Dif.1	*-0.116*	*0.127*	*0.050*	*-0.196*	*-0.023*	*0.094*	*-0.064*	*0.043*	*0.002*	***(0.965)***	*-0.200*	*-0.134*	*0.036*	*<0.001*
Dif.2	*0.036*	*-0.132*	*0.015*	*-0.005*	*-0.003*	*0.018*	*0.073*	*-0.059*	*0.117*	***(0.962)***	*-0.171*	*0.052*	*0.033*	*<0.001*
Dif.6	*0.083*	*0.005*	*-0.068*	*0.207*	*0.027*	*-0.115*	*-0.010*	*0.016*	*-0.123*	***(0.935)***	*0.382*	*0.085*	*0.041*	*<0.001*
Gro.3	*-0.241*	*0.166*	*-0.014*	*0.206*	*-0.004*	*-0.154*	*0.004*	*0.059*	*-0.235*	*0.225*	***(0.952)***	*0.033*	*0.034*	*<0.001*
Gro.6	*0.155*	*-0.107*	*-0.050*	*-0.076*	*0.022*	*-0.074*	*0.018*	*0.082*	*0.286*	*-0.310*	***(0.958)***	*0.199*	*0.038*	*<0.001*
Gro. 7	*0.085*	*-0.059*	*0.064*	*-0.128*	*-0.018*	*0.227*	*-0.022*	*-0.141*	*-0.052*	*0.087*	***(0.957)***	*-0.233*	*0.038*	*<0.001*
Qua.1	*0.008*	*-0.013*	*0.102*	*-0.018*	*0.009*	*0.020*	*0.053*	*-0.143*	*0.016*	*-0.135*	*0.346*	***(0.953)***	*0.039*	*<0.001*
Qua.2	*0.095*	*-0.013*	*-0.082*	*-0.001*	*-0.051*	*-0.069*	*0.098*	*-0.018*	*-0.055*	*-0.070*	*-0.004*	***(0.967)***	*0.036*	*<0.001*
Qua.3	*-0.104*	*0.026*	*-0.019*	*0.019*	*0.043*	*0.050*	*-0.152*	*0.161*	*0.039*	*0.206*	*-0.341*	***(0.957)***	*0.035*	*<0.001*

Notes: Rel=relative advantage; Com= compatibility; Compl=complexity; Top=top management support; fir=firm size; C.P=competitive pressure; P.P=business partner pressure; Gov=government support; Cos=cost reduction; Dif=differentiation; Gro=growth; Qua = quality.

Besides, convergent validity was measured, also, by average variance extracted (AVE). As shown in Table 5-20, the results reveal the AVEs, above the recommended level of 0.5, are an indicator for adequate convergent validity (Hair et al., 2010). Therefore, it could be said that these latent variables have satisfactory convergent validity.

Table 5-20: Average variance extracted (AVE): USA context

Constructs (reflective)	***AVE***
Relative advantage	0.93
Compatibility	0.93
Complexity	0.91
Top management support	0.84
Firm size	1.00
Competitive pressure	0.94
Business partner pressure	0.92
Government support	0.91

Cost Reduction	0.89
Differentiation	0.91
Growth	0.91
Quality	0.92

AVE: average variance extracted

Table 5-21 shows obviously that all of the square roots of AVEs are greater than the correlation of that relevant construct. In other words, the values on the diagonal are larger than any of the values below or above them in the same column and larger than any of the values to their right or left in the same row (Kock, 2012). Therefore, acceptable discriminate validity is created for each latent variable. The square roots of AVEs for each construct are shown within parentheses.

Table 5-21: Square roots of average variances extracted (AVEs): USA context

	Rel	*Com*	*Compl*	*Top*	*Fir*	*C.P.*	*P.P*	*Gov*	*Cos*	*Dif*	*Gro*	*Qua*
Rel	***(0.966)***	*0.8 52*	*0.785*	*0.8 02*	*-0.028*	*0.896*	*0.882*	*0.859*	*0.864*	*0.841*	*0.830*	*0.835*
Com	*0.8 52*	***(0.964)***	*0.758*	*0.8 10*	*-0.044*	*0.8 04*	*0.895*	*0.850*	*0.863*	*0.822*	*0.808*	*0.828*
Compl	*0.785*	*0.758*	***(0.954)***	*0.797*	*-0.064*	*0.774*	*0.806*	*0.825*	*0.729*	*0.715*	*0.702*	*0.715*
Top	*0.8 02*	*0.8 10*	*0.797*	***(0.966)***	*-0.027*	*0.8 09*	*0.8 05*	*0.868*	*0.832*	*0.823*	*0.802*	*0.806*
Fir	*-0.028*	*-0.044*	*-0.064*	*-0.027*	***(1.000)***	*-0.024*	*-0.033*	*-0.022*	*-0.048*	*-0.073*	*-0.062*	*-0.078*
C.P.	*0.896*	*0.8 04*	*0.774*	*0.8 09*	*-0.024*	***(0.970)***	*0.8 46*	*0.890*	*0.836*	*0.821*	*0.794*	*0.807*
P.P.	*0.882*	*0.895*	*0.806*	*0.8 05*	*-0.033*	*0.8 46*	***(0.979)***	*0.809*	*0.829*	*0.809*	*0.782*	*0.807*
Gov	*0.859*	*0.850*	*0.825*	*0.868*	*-0.022*	*0.890*	*0.8 09*	***(0.954)***	*0.822*	*0.810*	*0.769*	*0.791*
Cos	*0.864*	*0.863*	*0.729*	*0.832*	*-0.048*	*0.836*	*0.829*	*0.822*	***(0.981)***	*0.8 29*	*0.8 16*	*0.8 20*
Dif	*0.841*	*0.822*	*0.715*	*0.823*	*-0.073*	*0.821*	*0.809*	*0.810*	*0.829*	***(0.984)***	*0.8 19*	*0.8 38*
Gro	*0.830*	*0.808*	*0.702*	*0.802*	*-0.062*	*0.794*	*0.782*	*0.769*	*0.8 16*	*0.8 19*	***(0.976)***	*0.8 37*
Qua	*0.835*	*0.828*	*0.715*	*0.806*	*-0.078*	*0.807*	*0.807*	*0.791*	*0.820*	*0.8 38*	*0.8 37*	***(0.989)***

Notes: Rel=relative advantage; Com= compatibility; Compl=complexity; Top=top management support; fir=firm size; C.P=competitive pressure; P.P=business partner pressure; Gov=government support; Cos=cost reduction; Dif=differentiation; Gro=growth; Qua = quality.

5.5.1.1.2 Measurement model for reflective latent variables: Egyptian context

Table 5-22 shows the Cronbach's α and composite reliability for the Egypt sample and displays clearly that all latent variables are more than 0.7; this indicate acceptable internal consistency reliability.

Table 5-22: Cronbach's α and composite reliability: Egyptian context

Constructs (reflective)	***Cornbrash's α***	***CR****
Relative advantage	*0.77*	*0.87*
Compatibility	*0.92*	*0.96*
Complexity	*0.94*	*0.97*
Top management support	*0.75*	*0.83*
Firm size	*1.00*	*1.00*
Competitive pressure	*0.94*	*0.97*
Business partner pressure	*0.75*	*0.87*
Government support	*0.94*	*0.97*
Cost Reduction	*0.88*	*0.93*
Differentiation	*0.94*	*0.96*
Growth	*0.74*	*0.86*
Quality	*0.86*	*0.91*

CR: composite reliability

Additionally, Table 5-23 shows the loading and cross-loading of indicators for the Egyptian sample. The results illustrate that three out of six for relative advantage; two out of five for compatibility; two out of four indicators of complexity; three out of seven indicators of top management support; two out of three indicators of competitive pressure, two out of four indicators of business partner pressure, and two out of six indicators of government support are found to be significant and with loadings higher than 0.5. Having regard to competitive advantage, the results reveal

that three out of nine for cost reduction; three out of seven forms of differentiation; and three out of seven indicators of growth. Finally, three out of six indicators of quality are found to be significant and the loadings higher than 0.5 (Vinzi et al., 2010, Hair et al., 2011, Kock, 2012).

Table 5-23: Loading and cross-loading of indicators for Egyptian sample

	Rel	Com	Compl	Top	Fir	C.P.	P.P.	Gov	Cos	Dif	Gro	Qua	SE	P value
Rel.1	**(0.781)**	0.214	0.629	-0.439	0.107	0.090	0.787	0.002	-0.044	0.038	-0.022	0.063	0.063	<0.001
Rel.2	**(0.841)**	-0.107	-0.094	0.119	-0.142	0.094	-0.175	0.043	0.044	-0.057	0.065	-0.040	0.121	<0.001
Rel.3	**(0.863)**	-0.089	-0.477	0.282	0.042	-0.173	-0.541	-0.044	-0.003	0.022	-0.044	-0.018	0.111	<0.001
Com.2	-0.002	**(0.963)**	0.100	-0.062	0.001	0.007	0.140	-0.004	0.050	-0.041	-0.042	0.037	0.108	<0.001
Com.4	0.002	**(0.963)**	-0.100	0.062	-0.001	-0.007	-0.140	0.004	-0.050	0.041	0.042	-0.037	0.084	<0.001
Compl.1	0.020	0.031	**(0.973)**	-0.120	-0.088	0.016	0.298	0.024	-0.010	-0.004	-0.031	0.001	0.016	<0.001
Compl.4	-0.020	-0.031	**(0.973)**	0.120	0.088	-0.016	-0.298	-0.024	0.010	0.004	0.031	-0.001	0.009	<0.001
Top.2	-0.031	-0.041	0.719	**(0.922)**	0.100	0.019	1.417	-0.007	0.037	0.022	0.051	-0.020	0.049	<0.001
Top.4	0.094	0.067	-1.402	**(0.668)**	-0.329	-0.291	-2.871	-0.085	0.053	-0.084	-0.100	0.009	0.072	<0.001
Top.6	-0.037	-0.052	0.287	**(0.935)**	0.103	-0.049	0.579	0.117	-0.077	0.055	0.018	0.069	0.044	<0.001
Fir	-0.000	0.000	0.000	-0.000	**(1.000)**	0.000	0.000	0.000	-0.000	0.000	0.000	0.000	0.044	<0.001
C.P.1	0.020	0.029	0.201	-0.157	0.007	**(0.973)**	0.235	-0.012	0.012	0.017	0.002	0.026	0.107	<0.001
C.P.3	-0.020	-0.029	-0.201	0.157	-0.007	**(0.973)**	-0.235	0.012	-0.012	-0.017	-0.002	-0.026	0.123	<0.001
P.P.1	-0.018	-0.030	0.751	0.100	0.086	-0.027	**(0.881)**	-0.024	0.012	0.006	0.031	-0.001	0.062	<0.001
P.P.3	-0.018	-0.030	0.751	0.100	0.086	-0.027	**(0.881)**	-0.024	0.012	0.006	0.031	-0.001	0.021	<0.001
Gov.1	-0.041	-0.000	-0.035	-0.025	0.026	0.019	0.014	**(0.973)**	0.019	0.016	-0.025	-0.034	0.152	<0.001
Gov.5	0.041	0.000	0.035	0.025	-0.026	-0.019	-0.014	**(0.973)**	-0.019	-0.016	0.025	0.034	0.163	<0.001
Cos.1	0.087	-0.003	-0.070	0.108	-0.105	-0.043	-0.168	-0.015	**(0.925)**	-0.016	0.046	0.045	0.099	<0.001
Cos.2	0.003	0.013	-0.195	0.007	0.026	-0.025	-0.141	-0.025	**(0.876)**	-0.162	-0.127	-0.047	0.097	<0.001
Cos.6	-0.092	-0.009	0.262	-0.118	0.083	0.069	0.311	0.040	**(0.897)**	0.175	0.076	-0.001	0.097	<0.001
Dif.1	0.096	-0.003	-0.102	0.126	-0.130	-0.080	-0.217	-0.010	0.104	**(0.917)**	-0.035	0.012	0.073	<0.001
Dif.2	-0.043	0.025	-0.086	0.000	0.055	0.037	-0.052	-0.006	-0.009	**(0.965)**	-0.025	-0.020	0.066	<0.001
Dif.5	-0.049	-0.023	0.187	-0.122	0.070	0.040	0.264	0.015	-0.091	**(0.944)**	0.060	0.008	0.072	<0.001

Gro.1	*-0.030*	*-0.039*	*0.893*	*-0.379*	*0.134*	*-0.137*	*1.076*	*0.174*	*-0.012*	*0.197*	***(0.7 63)***	*0.018*	*0.202*	*0.003*
Gro.3	*-0.000*	*0.018*	*-0.474*	*0.232*	*-0.076*	*0.006*	*-0.712*	*-0.043*	*0.052*	*-0.090*	***(0.919)***	*0.008*	*0.100*	*<0.001*
Gro.4	*0.018*	*0.006*	*-0.072*	*-0.000*	*-0.006*	*0.077*	*0.053*	*-0.063*	*-0.045*	*-0.030*	***(0.928)***	*-0.019*	*0.094*	*<0.001*
Qua.2	*-0.061*	*-0.059*	*-0.496*	*-0.050*	*0.117*	*0.094*	*-0.382*	*-0.024*	*0.027*	*-0.000*	*0.087*	***(0.896)***	*0.170*	*<0.001*
Qua.4	*0.062*	*-0.034*	*0.486*	*-0.040*	*-0.034*	*-0.132*	*0.494*	*0.004*	*-0.196*	*0.117*	*-0.004*	***(0.839)***	*0.136*	*<0.001*
Qua.6	*0.003*	*0.089*	*0.040*	*0.087*	*-0.084*	*0.029*	*-0.079*	*0.019*	*0.154*	*-0.108*	*-0.081*	***(0.910)***	*0.217*	*<0.001*

Notes: Rel=relative advantage; Com= compatibility; Compl=complexity; Top=top management support; fir=firm size; C.P=competitive pressure; P.P=business partner pressure; Gov=government support; Cos=cost reduction; Dif=differentiation; Gro=growth; Qua = quality.

Also, Table 5-24 displays clearly that all AVE are above the recommended level of 0.5. This is an indicator of acceptable convergent validity.

Table 5-24: Average variance extracted (AVE): Egyptian context

Constructs (reflective)	***AVE***
Relative advantage	0.69
Compatibility	0.93
Complexity	0.95
Top management support	0.67
Firm size	1.00
Competitive pressure	0.95
Business partner pressure	0.78
Government support	0.95
Cost Reduction	0.81
Differentiation	0.89
Growth	0.68
Quality	0.78

AVE: average variance extracted

Concerning discriminate validity, the results show that all of the square roots of average variances extracted (AVEs) are more than the correlation of that respective construct. In other words, the values on the diagonal are larger than any of the

values below or above them in the same column and larger than any of the values to their right or left in the same row (Kock, 2012), as shown in the Table below. This indicates that, for each latent variable, the latent variable has acceptable discriminate validity.

Table 5-25: Square roots of average variances extracted (AVEs): Egyptian context

	Rel	*Com*	*Compl*	*Top*	*Fir*	*C.P.*	*P.P.*	*Gov*	*Cos*	*Dif*	*Gro*	*Qua*
Rel	***(0.829)***	*0.109*	*0.105*	*-0.061*	*0.192*	*0.355*	*-0.118*	*0.391*	*0.135*	*0.140*	*0.246*	*0.063*
Com	*0.109*	***(0.963)***	*0.173*	*-0.061*	*0.129*	*0.029*	*-0.134*	*0.000*	*0.046*	*0.079*	*0.128*	*0.096*
Compl	*0.105*	*0.173*	***(0.973)***	*-0.401*	*0.528*	*0.032*	*-0.6 57*	*-0.041*	*0.048*	*0.039*	*-0.171*	*-0.104*
Top	*-0.061*	*-0.061*	*-0.401*	***(0.8 55)***	*-0.288*	*0.186*	*0.5 53*	*0.074*	*0.127*	*0.085*	*0.065*	*0.019*
Fir	*0.192*	*0.129*	*0.528*	*-0.288*	***(1.000)***	*0.055*	*-0.532*	*0.012*	*0.057*	*0.036*	*-0.101*	*-0.045*
C.P.	*0.355*	*0.029*	*0.032*	*0.186*	*0.055*	***(0.973)***	*0.033*	*0.197*	*0.216*	*0.223*	*0.116*	*0.112*
P.P.	*-0.118*	*-0.134*	*-0.6 57*	*0.5 53*	*-0.532*	*0.033*	***(0.9 81)***	*0.018*	*0.007*	*-0.016*	*0.100*	*0.071*
Gov	*0.391*	*0.000*	*-0.041*	*0.074*	*0.012*	*0.197*	*0.018*	***(0.973)***	*0.077*	*0.108*	*0.232*	*0.064*
Cos	*0.135*	*0.046*	*0.048*	*0.127*	*0.057*	*0.216*	*0.007*	*0.077*	***(0.900)***	*0.786*	*0.171*	*0.199*
Dif	*0.140*	*0.079*	*0.039*	*0.085*	*0.036*	*0.223*	*-0.016*	*0.108*	*0.786*	***(0.942)***	*0.261*	*0.213*
Gro	*0.246*	*0.128*	*-0.171*	*0.065*	*-0.101*	*0.116*	*0.100*	*0.232*	*0.171*	*0.261*	***(0.821)***	*0.189*
Qua	*0.063*	*0.096*	*-0.104*	*0.019*	*-0.045*	*0.112*	*0.071*	*0.064*	*0.199*	*0.213*	*0.189*	***(0.882)***

Notes: Rel=relative advantage; Com= compatibility; Compl=complexity; Top=top management support; fir=firm size; C.P=competitive pressure; P.P=business partner pressure; Gov=government support; Cos=cost reduction; Dif=differentiation; Gro=growth; Qua = quality.

5.5.1.2 Measurement model for formative latent variables

In order to test the formative measurement models' validity and reliability, the warp PLS 3.0 software offers these evaluation measures: Weights and p value that must be examined for each indicator of the formative latent variable (Kock, 2012). Miller and Wichern (1977), Mueller (1996) and Kock (2012) recommended that a weight, with P values less than 0.05, ought to be considered a valid item in a formative construct. Indicators of formative construct, which do not satisfy this criterion, ought to be removed (Kock, 2012). In addition to P values, PLS offers Variance Inflation

Factors (VIFs); these provided for the all items of construct. Kline (1998); Hair et al. (2009) and Kock (2012) recommended that VIFs have to be less than 10. Formative construct items, which do not satisfy this criterion, ought to be removed (Kock, 2012).

In this study, the researcher examined the measurement model for levels of B2B e-commerce adoption; these are considered to be a formative latent construct for both the American and Egyptian samples. The next two sections show the detailed procedure for in assessing the formative measurement models for the American and Egyptian contexts respectively.

5.5.1.2.1 Measurement model for formative latent variables: USA context

Table 5-26 demonstrates that the P-values of all indicators of formative latent variable are less than 0.05. The table shows, also, that, for all of the indicators of all of the formative latent variables, the VIFs are lower than 10 (Hair et al., 2011, Kock, 2012). Standard errors are provided, also, for all formative latent indicators. These indicate that all the formative latent variables have adequate reliability and validity. In addition, it is clear that the American SMEs show significant responses on all eBPs in all four levels of B2B e-commerce adoption demonstrating the maturity of adoption among the US enterprises.

Table 5-26: Measurement model for formative latent variable: USA context

Constructs (formative)		*Weight*	*S.E*	*P Value*	*VIF*
Level 1: electronic information search and creation	*levelA1*	*0.04*	*0.01*	*<0.01*	*4.29*
	levelA2	*0.04*	*0.01*	*<0.01*	*4.95*
	levelA3	*0.04*	*0.01*	*<0.01*	*3.89*
	levelA4	*0.03*	*0.01*	*<0.01*	*3.89*
	levelA5	*0.04*	*0.01*	*<0.01*	*4.07*
Level 2: simple electronic transactions	*levelB1*	*0.04*	*0.01*	*<0.01*	*4.51*
	levelB2	*0.03*	*0.01*	*<0.01*	*4.26*
	levelB3	*0.04*	*0.01*	*<0.01*	*5.79*
	levelB4	*0.04*	*0.01*	*<0.01*	*3.99*
	levelB5	*0.03*	*0.01*	*<0.01*	*3.69*
	levelB6	*0.04*	*0.01*	*<0.01*	*5.23*
	levelB7	*0.03*	*0.01*	*<0.01*	*3.28*
Level 3: complex electronic transactions	*levelC1*	*0.04*	*0.01*	*<0.01*	*6.51*
	levelC2	*0.04*	*0.01*	*<0.01*	*8.60*
	levelC3	*0.03*	*0.01*	*<0.01*	*4.94*
	levelC4	*0.04*	*0.01*	*<0.01*	*4.50*
	levelC5	*0.04*	*0.02*	*<0.01*	*8.22*
	levelC6	*0.04*	*0.01*	*<0.01*	*8.51*
	levelC7	*0.04*	*0.01*	*<0.01*	*8.37*
	levelC8	*0.04*	*0.01*	*<0.01*	*8.04*
	levelC9	*0.04*	*0.01*	*<0.01*	*7.39*
	levelC10	*0.04*	*0.01*	*<0.01*	*7.11*
	levelC11	*0.04*	*0.01*	*<0.01*	*5.34*
	levelC12	*0.04*	*0.01*	*<0.01*	*4.17*
Level 4: electronic collaboration	*LevelD1*	*0.04*	*0.01*	*<0.01*	*5.25*
	LevelD2	*0.04*	*0.01*	*<0.01*	*6.52*
	LevelD3	*0.04*	*0.01*	*<0.01*	*4.28*
	LevelD4	*0.04*	*0.01*	*<0.01*	*5.28*
	LevelD5	*0.04*	*0.01*	*<0.01*	*7.02*
	LevelD6	*0.04*	*0.01*	*<0.01*	*8.56*
	LevelD7	*0.04*	*0.01*	*<0.01*	*4.1 8*
	LevelD8	*0.04*	*0.01*	*<0.01*	*6.01*
	LevelD9	*0.04*	*0.01*	*<0.01*	*6.28*
	LevelD10	*0.04*	*0.01*	*<0.01*	*8.36*
	LevelD11	*0.04*	*0.01*	*<0.01*	*8.55*
	LevelD12	*0.04*	*0.01*	*<0.01*	*3.74*

VIF: variance inflation factor, S.E: standard error

5.5.1.2.2 Measurement model for formative latent variables: Egyptian context

For the Egyptian sample, although the firms at level 1 are similar to the firms at level 1 in US sample, those at level 2, 3, and 4 differ. As can be seen from the data in Table 5-27, the results show that two out of seven at level 2, five out of twelve at level three and one out of twelve at level 4 are found to be significant and with VIF less than 10.

Table 5-27: Measurement model for formative latent variable: Egyptian context

Independent Constructs (formative)		*Weight*	*SE*	*P Value*	*VIF*
Level 1	*levelA1*	*0.08*	*0.03*	*<0.01*	*2.14*
	levelA2	*0.12*	*0.04*	*<0.01*	*9.45*
	levelA3	*0.09*	*0.02*	*<0.01*	*2.53*
	levelA4	*0.12*	*0.04*	*<0.01*	*9.14*
	levelA5	*0.09*	*0.04*	*<0.05*	*2.38*
Level 2	*LevelB5*	*0.09*	*0.05*	*<0.05*	*3.05*
	LevelB7	*0.08*	*0.05*	*<0.05*	*2.61*
Level 3	*LevelC3*	*0.13*	*0.06*	*<0.05*	*8.65*
	LevelC5	*0.12*	*0.06*	*<0.05*	*4.04*
	LevelC8	*0.13*	*0.05*	*<0.01*	*5.04*
	LevelC10	*0.12*	*0.06*	*<0.05*	*6.79*
	LevelC12	*0.13*	*0.06*	*<0.05*	*6.28*
Level 4	*LevelD11*	*0.11*	*0.06*	*<0.05*	*4.50*

VIF: variance inflation factor S.E: standard error

It is clear that the Egyptian manufacturing SMEs have implemented only two eBPs from B2B e-commerce adoption level2, while the USA enterprises have implemented seven. At level 3, the Egyptian enterprises have implemented five compared to the USA firms' twelve. At level 4, the Egyptian firms have implemented one and the USA SMEs twelve, a significant difference. These results reveal how far the Egyptian SMEs

are behind their USA peers regarding B2B e-commerce adoption, which supports the H15.

Moreover, the researcher measured the full collinearity in order to know if there was multicollinearity amongst all of the constructs. The Warp PLS 3.0 software showed automatically the full collinearity variance inflation factors (VIFs) (Kock, 2012). The full collinearity examination depends on the VIFs calculated for each construct in relation to all of the other constructs (Kline, 2011). As, can be seen from the Table 5-28 and 5-29. The study's results, for both samples, found that, as recommended by (Kline, 1998, Hair et al., 2009), the VIFs values for all constructs were lower than 10.

Table 5-28: VIFs from full collinearity test for the USA context

Constructs	***VIFs***
Level of adoption	2.43
Relative advantage	6.88
Compatibility	5.10
Complexity	3.67
Top management support	4.32
Firm size	1.12
Competitive pressure	5.47
Business partner pressure	4.55
Government support	3.58
Cost Reduction	5.29
Differentiation	4.17
Growth	3.43
Quality	6.08

VIFs: variance inflation factors

Table 5-29: VIFs from full collinearity test for the Egyptian context

Constructs	***VIFs***
Level of adoption	*2.16*
Relative advantage	*1.56*

Compatibility	*1.10*
Complexity	*5.89*
Top management support	*5.54*
Firm size	*1.51*
Competitive pressure	*1.62*
Business partner pressure	*4.49*
Government support	*1.28*
Cost Reduction	*2.72*
Differentiation	*2.78*
Growth	*1.38*
Quality	*1.12*

VIFs: variance inflation factors

In summary, in both the American and Egyptian contexts, the measurement model passed the tests of reliability, convergent validity, discriminant validity and multi-collinearity. These mean that, in both contexts, models met extensively accepted data validation standards, and recommended that the results of the Structural Equation Model (SEM) could be trusted mostly as free from data measurement issues (Schumacker and Lomax, 2004, Kline, 2010). The next section discusses the structural model's results.

5.5.2 Structural model

The structural model (inner model) is used to measure the causal relationships among the constructs, and these relationships among latent variables are hypothesized in agreement with the literature review and reasonable reasoning.

The structural model could be evaluated by testing the path coefficients with their respective p values (Chin, 1998, Kock, 2012); this shows the strength of the relationships between variables (Chwelos et al., 2001). Besides, the P value,

associated with each path coefficient is substantial for hypothesis examining purposes. In addition, the P value does not show only the power of the relationship which is given already by the path coefficient itself but, also, the strength of the examination. Also, it is essential to interpreting the results of the research (Kock, 2012).

Moreover, the path coefficient and significance p value ($P<0.05$) support the suggested fundamental empirical relationship between constructs. On the other hand, the path coefficients with insignificant p value ($P \geq 0.05$) do not support the hypothesis (Vinzi et al., 2010). Additionally, in PLS-based SEM analysis, the "Beta coefficient" is used frequently to indicate path coefficients.

In addition to the path coefficients, the researcher considered the R-squared coefficients (R^2) to be logical criteria for judging the structural model (Vinzi et al., 2010). This reflects the amount of the variance in the construct which is explained by the constructs which are assumed to affect it (Kock, 2012). In other words, the R^2 measures the percentage of variation that is explained by the model (Hair et al., 2011). In addition, the R^2 is used to evaluate explanatory power of the structural model in the dependent constructs. Additionally, the values of R^2 ought to be between 0 and 1, and, also, the high value of R^2 explained the greater the percentage of variance (Vinzi et al., 2010). Besides, R^2 shows the predictive power of the model (Chwelos et al., 2001). Furthermore, R^2 and the path coefficients show how well the model is performing.

In addition to R^2, the structural model could be evaluated, also, by examining the effect sizes (f^2); these are provided for each path coefficient. Effect sizes can be defined as the amount of the effect of the independent variable on the dependent variable (Kline, 2010). In other words, the effect size shows whether an independent construct has a substantial effect on the dependent construct.

Through the effect sizes, the researcher is able to determine whether the impacts, showed by path coefficients are weak, moderate or has substantial influence. The Values for effect size of 0.02, 0.15, or 0.35 show the exogenous construct`s (independent variables) has small, medium or large influence on the particular endogenous construct (dependent variables) (Chin, 1998, Kock, 2012). It is recommended that, even although the P values are statistically significant, the impacts of values lower than 0.02 are too weak.

Moreover, the structural model should be assessed, also, by examining the Q-squared coefficients (Q^2) that are used to evaluate the predictive validity associated with each endogenous construct in the model. A Q-squared coefficient greater than zero ($Q^2 > 0$) suggests that the model is considered to have predictive validity, whilst Q-squared coefficients lower than zero ($Q^2 < 0$) denotes a lack of predictive validity (Chin, 1998). In addition, Q^2 and R^2 are provided only for endogenous latent variables (dependent variables); Q^2 reflect the predictive validity; and R^2 reflect the percentage of explained variance.

For the American sample, the researcher tested four models to investigate how, on the one hand, the technological context (relative advantage, compatibility and complexity), organisational context (top management support and firm size), and environmental context (competitive pressure, business partner pressure and government support) affect the four levels of B2B e-commerce adoption and, on the other hand, how these four adoption levels affect the competitive advantage(cost reduction, differentiation, growth and quality) in manufacturing SMEs (Figures 5-1, 3, 5, and7).

Similarly, for the Egyptian sample, the researcher tested four models in order to examine how, on the one hand, the technological context (relative advantage, compatibility and complexity), organisational context (top management support and Firm size), and environmental context (competitive pressure, business partner pressure and government support) affect the four levels of B2B e-commerce adoption and how, on the other hand, as shown in Figures 5-2, 4, 6, and 8, these four adoption levels affect the competitive advantage (cost reduction, differentiation, growth and quality). The following four sections show the detailed procedures used to assess the structural model in each model.

5.5.2.1 Structural model for level 1

5.5.2.1.1 Structural model for level 1: USA context

Regarding level 1 in USA `s manufacturing SMEs, it was found that relative advantage has a positive effect on level 1 adoption (β=0.53, P<.01) and that compatibility has a

positive effect on level 1 adoption (β=0.26, P<.01). Therefore, these support hypotheses H1, H1a and H1b. In addition, the top management support has a positive effect on level 1 adoption (β=0.32, P<.01), and the firm size has a positive effect on level 1 adoption (β=0.20, P<.01). These validate hypotheses H5, H5a and H5 b. Also, government support has a positive effect on level 1 adoption (β=0.14, P<.03) which support hypotheses H9 and H9c. On the other hand, complexity, competitive pressure and business partner pressure do not affect level 1 adoption. Consequently, hypotheses H1c, H9a and H9b are rejected. Besides, the level 1 affect positively and significantly cost reduction (β=0.69, P<.01), differentiation (β=0.69, P<.01), growth (β=0.68, P<.01) and quality (β=0.69, P<.01). These support hypotheses H16, H16a, H16b, H16c and H16d respectively.

R^2 is the second point used to judge a structural model. It was found that together relative advantage, compatibility, top management support, firm size and government support explained 29% of the variance in level 1. On the other hand, the level 1 of adoption explains 48% of the variance in cost reduction, 48% of the variance in differentiation, 46% of the variance in growth, and 48% of the variance in quality.

With regard to effect size *(f^2)* and from the statistical analysis of the research model, the results indicated that the effect size for relative advantage, compatibility, top management, firm size and government support: are 0.369, 0.166, 0.221, 0.033, and 0.093 respectively. These indicate that relative advantage has a large effect on level 1 adoption. On the other hand, firm size has a weak effect on level 1 adoption. The

results show, also, that level 1 adoption has a strong effect on cost reduction, differentiation, growth and quality; these are 0.477, 0.478, 0.462 and 0.480 respectively.

The researcher tested the model's predictive validity by using Q-squared coefficients (Q^2) which were provided only for endogenous latent variables. Table 5-30 reports the Q^2 for level 1, cost reduction, differentiation, growth and quality.

Table 5-30: Q-squared (Q^2)

Latent variable	**Q^2**
Level 1 of adoption	0.28
Cost reduction	0.48
differentiation	0.48
Growth	0.46
Quality	0.48

Q^2*: Q-squared coefficients*

The results indicate that the model's predictive validity seems to be convinced since, as displayed in Table 5-30, the Q^2 for level 1 of adoption, cost reduction, growth and quality are greater than zero.

Regarding the indirect effect of technological factors on competitive advantage, the results show that relative advantage has a positive effect on cost reduction (β=0.365, P<.01), differentiation (β=0.366, P<.01), growth (β=0.359, P<.01) and quality (β=0.366, P<.01); and compatibility has a significant and positive effect on cost reduction (β=0.177, P<.01), differentiation (β=0.177, P<.01), growth (β=0.174, P<.01) and quality (β=0.177, P<.01). These support hypothesis H22.

For the indirect effect of organisational factors on competitive advantage, it was found that top management support has a positive effect on cost reduction (β=0.223, P<.01), differentiation (β=0.223, P<.01), growth (β=0.219, P<.01) and quality (β=0.224, P<.01); and firm size has a positive effect on cost reduction (β=0.137, P<.01), differentiation (β=0.137, P<.01), growth (β=0.135, P<.01) and quality (β=0.137, P<.01). These validate hypothesis H23. In addition, the results of the indirect effect of environmental factor on competitive advantage indicate that government support has a positive effect on cost reduction (β=0.098, P<.03), differentiation (β=0.098, P<.03), growth (β=0.096, P<.03) and quality (β=0.098, P<.03). These support hypothesis H24.

In addition to the path coefficients and the P values, the WarpPLS software provides effect size for indirect effects (Kock, 2012). The results which are 0.320, 0.314, 0.303 and 0.311 respectively reveal that relative advantage has a medium effect on cost reduction, differentiation, growth and quality; and compatibility has a medium effect on cost reduction which was 0.152. On the other hand, it has a small effect on differentiation, growth and quality; the results are 0.146, 0.142 and 0.147 respectively.

Regarding the organisational factors, it was found that top management support has a medium effect on cost reduction, differentiation, growth and quality; the results are 0.188, 0.186, 0.179 and 0.183 respectively. On the other hand, firm size has a very weak effect on cost reduction, differentiation, growth and quality; the results are 0.007, 0.010, 0.008 and 0.011 respectively. This is because, even although the P

values are statistically significant, the values are lower than the recommended 0.02 and, therefore, the impacts are too weak. For government support, the results indicate that government support has a small effect on cost reduction, differentiation, growth and quality; the results are 0.082, 0.081, 0.076 and 0.080 respectively.

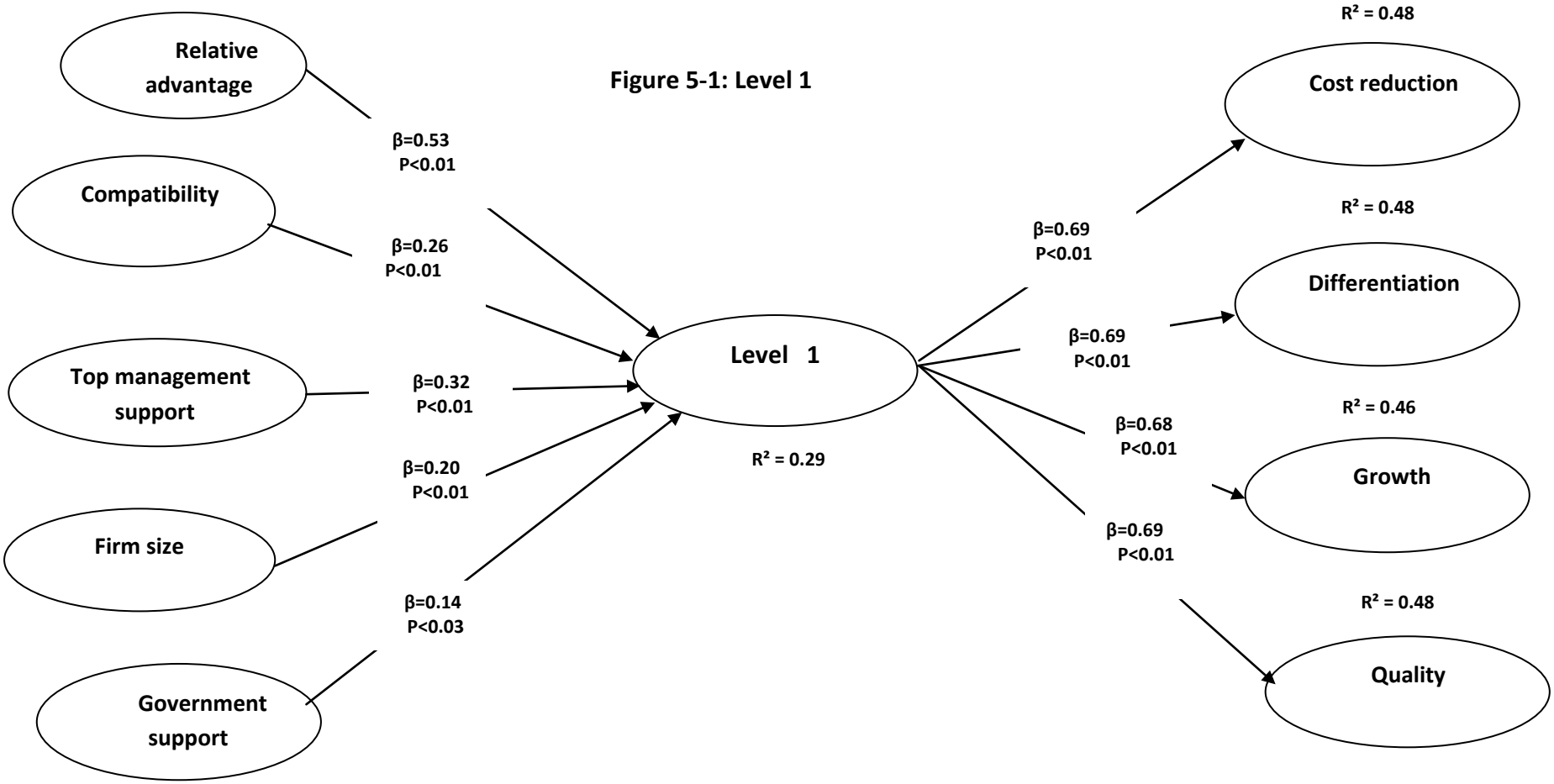


Figure 5-1: Level 1

5.5.2.1.2 Structural model for level 1: Egyptian context

For level 1 in Egypt`s manufacturing SMEs, both relative advantage and competitive pressure have a positive effect on the level 1, (β=0.13, P<.03) and (β=0.36, P<.01) respectively. These support hypotheses H1, H1a, H9 and H9a. However, compatibility, complexity, top management support, firm size, business partner pressure and government support do not affect level 1 of adoption. Therefore, hypotheses H1b, H1c, H5, H5a, H5b, H9b and H9c are rejected.

In addition, the path from level 1 to cost reduction, differentiation and growth were found to be positive and significant at the (β=0.28, P<.01), (β=0.28, P<.01) and (β=0.47, P<.01) respectively. These support hypotheses H16, H16a, H16b and H16c. On the other hand, level 1 does not affect quality. Thus, hypothesis H16d is rejected.

According to R^2, It was found that relative advantage and competitive pressure together explain 17% of the variance in level 1. Whilst, the level 1 of adoption explains 8% of the variance in cost reduction, 8% of the variance in differentiation, and 22% of the variance in growth.

The results from the statistical analysis of the research model indicated that the effect size for relative advantage and competitive pressure are 0.028 and 0.15 respectively. This suggests that, on the one hand, competitive pressure has medium effect on level 1 of adoption. On the other hand, relative advantage has a weak effect on the level 1 of adoption .The results indicate, also, that level 1 of adoption

has a weak effect on cost reduction and differentiation; these are 0.079 and 0.081 respectively. Whereas, it has medium influence on growth which is 0.223.

Table 5-31 shows the main results related to the Q-squared coefficients (Q^2).

Table 5-31: Q-squared

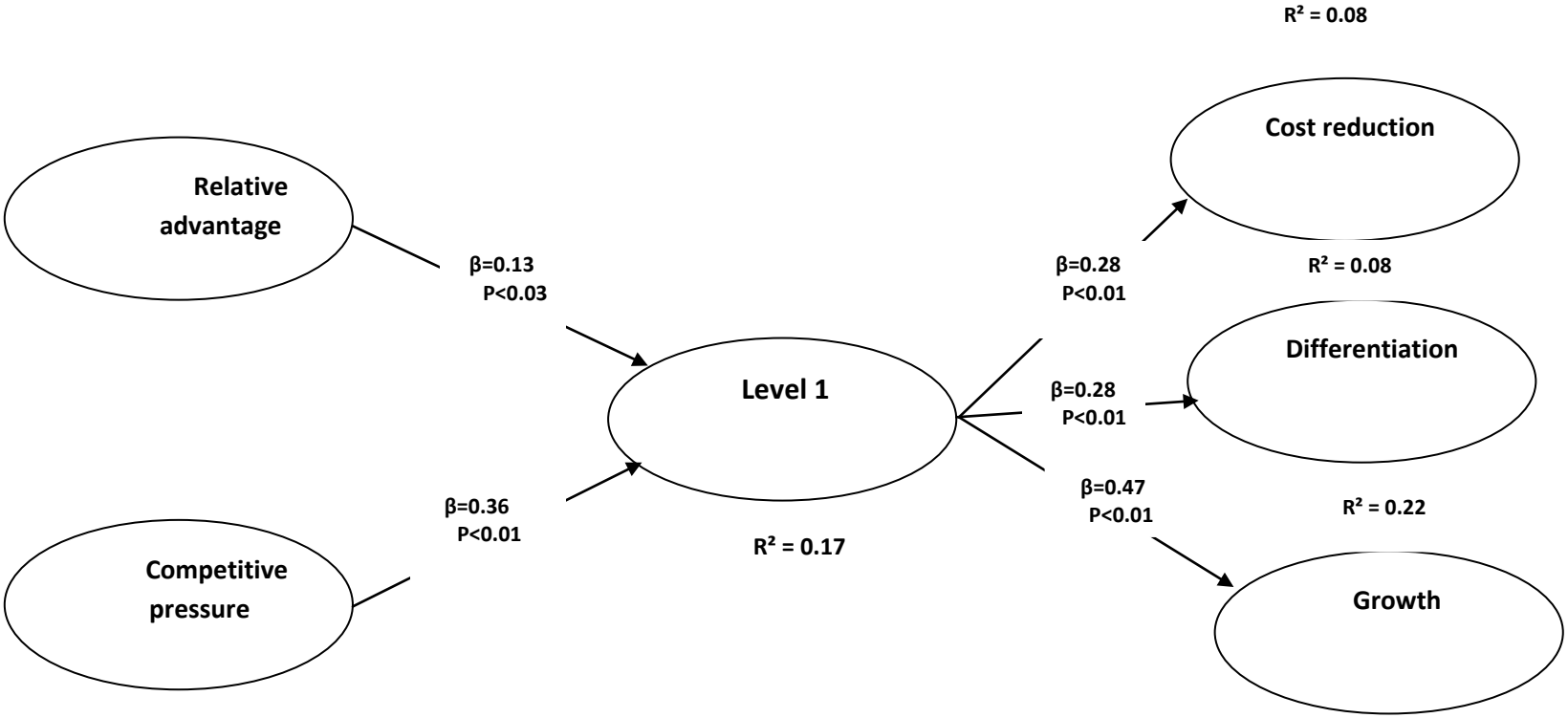
Latent variable	**Q^2**
Level 1 of adoption	*0.18*
Cost reduction	*0.09*
differentiation	*0.09*
Growth	*0.23*

Q^2*: Q-squared coefficients*

As illustrated in Table 5-31 the Q^2 value for level 1, cost reduction, differentiation and growth that are greater than zero. This indicates that the achievement of predictive validity for the research model.

For the indirect effect of technological factors, organisational factors and environmental factors on competitive advantage, the results reveal that technological factors and organisational factors do not have a significant effect on competitive advantage. On the other hand, competitive pressure, one of the environmental factors has a significant and positive effect on growth (β=0.171, P<.03). In addition, the results of the statistical analysis of the study indicate that the effect size for competitive pressure is 0.020; this implies that competitive pressure has a small effect on growth. Consequently, these support hypothesis H24. In contrast, hypotheses H22 and H23 are rejected. .

Figure 5-2: level 1



5.5.2.2 Structural model for level 2

5.5.2.2.1 Structural model for level 2: USA context

As shown in figure 5-3, the results indicate that relative advantage, top management support, firm size, competitive pressure and government support have positive impacts on level 2 of adoption. Regarding compatibility, complexity, and business partner pressure, they do not have significant impact on level 2 of adoption. In addition, the level 2 has a significant and positive impact on the cost reduction (β=0.69, P<.01), differentiation (β=0.69, P<.01), growth (β=0.67, P<.01) and quality (β=0.69, P<.01). Consequently, these support hypotheses H2, H2a, H6, H6a, H6b, H10, H10a, and H10c, H17, H17a, H17b, H17c and H17d. In contrast, hypotheses H2b, H2c, and H10b are rejected.

From the statistical analysis, it was found that, together, relative advantage; top management support, firm size, competitive pressure and government support explain 42% of the variance in level 2 of adoption. Whilst, as illustrate in figure 5-3, this adoption level explain 48% of the variance in cost reduction, 48% of the variance in differentiation, 45% of the variance in growth, and 48% of the variance in quality.

According to effect size (f^2), the results of 0.281 and 0.219 respectively indicated that relative advantage and top management support have a medium effect on level 2 of adoption. However, the results of 0.0219, 0.113 and 0.135 respectively in respect of firm size, competitive pressure and government support have a weak effect on level 2 of adoption. On the other hand, it was found that the results of 0.477, 0.475, 0.453

and 0.477 respectively from level 2 of adoption has a strong effect on cost reduction, differentiation, growth and quality.

Table 5-32 reports the Q^2 in respect of the level 2, cost reduction, differentiation, growth and quality. The Q^2-values above zero indicated that the model has predictive relevance. Once, Q^2-values are less than zero, these show the lack of predictive relevance.

Table 5-32: Q-squared

Latent variable	**Q^2**
Level 2 of adoption	*0.41*
Cost reduction	*0.48*
differentiation	*0.47*
Growth	*0.45*
Quality	*0.48*

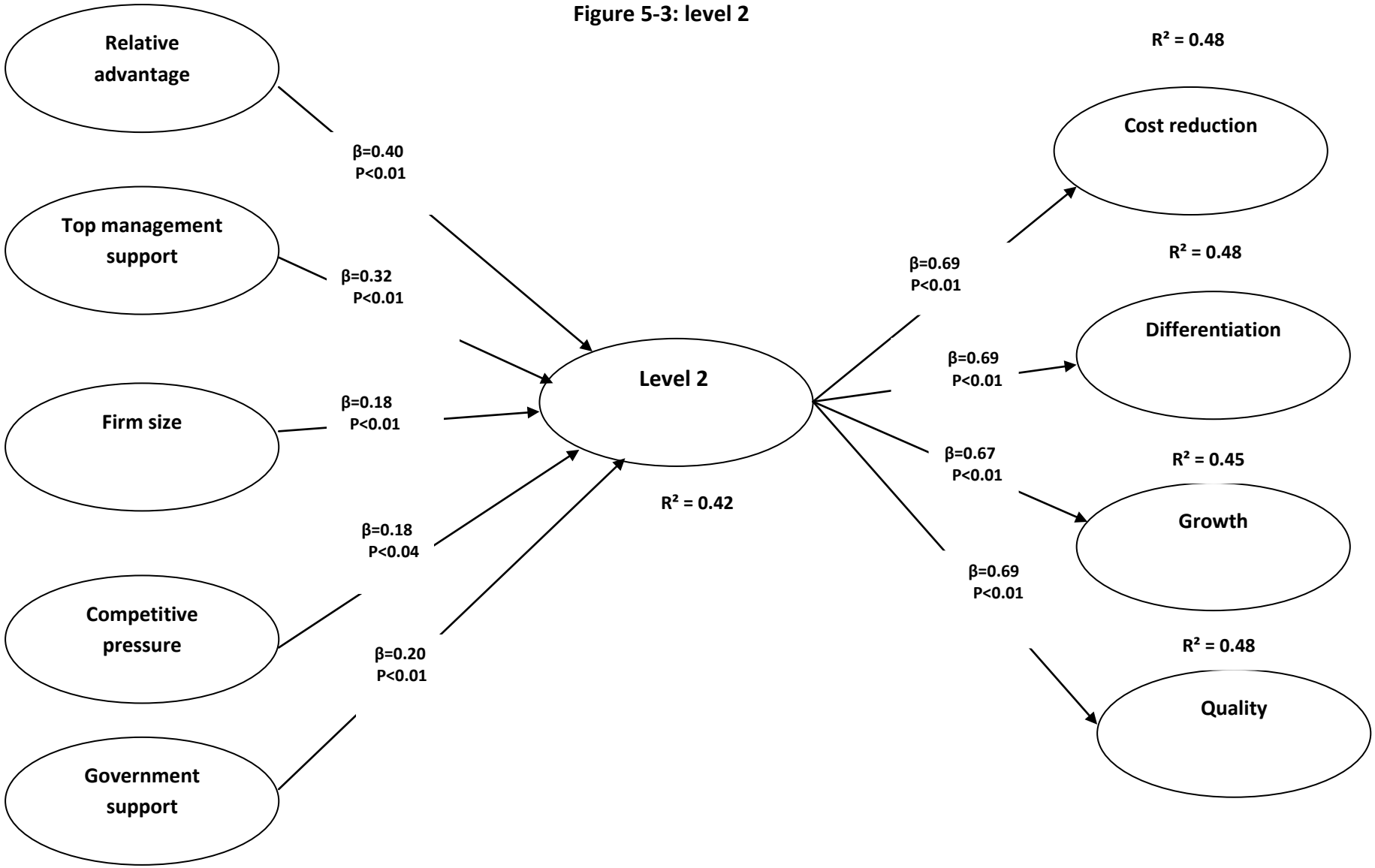
Q^2*: Q-squared coefficients*

Furthermore, the results of the technological factors' indirect effect on competitive advantage show that relative advantage has a significant and positive effect on cost reduction (β=0.278 , P<.01), differentiation (β=0.277 , P<.01), growth (β=0.271 , P<.01) and quality (β=0.278 , P<.01). These results support hypothesis H22. For the indirect effect of organisational factors on competitive advantage, it was found that top management support has a positive effect on cost reduction (β=0.218 , P<.01), differentiation (β=0.217 , P<.01), growth (β=0.212 , P<.01) and quality (β=0.218 , P<.01); and firm size has a significant and positive effect on cost reduction (β= 0.122, P<.01), differentiation (β=0.122 , P<.01), growth (β=0.119 , P<.01) and quality (β=0.122 , P<.01). These results validate hypothesis H23. Besides, the results of

indirect effect of environmental factor on competitive advantage revealed that competitive pressure has a positive effect on cost reduction (β=0.123 , P<.04), differentiation (β=0.123 , P<.04), growth (β=0.120 , P<.04) and quality (β=0.123 , P<.04). In addition to competitive pressure, government support has a positive effect on cost reduction (β=0.141 , P<.01), differentiation (β=0.140 , P<.01), growth (β= 0.137, P<.01) and quality (β=0.140 , P<.01). These results support hypothesis H24.

Additionally, it was found that the relative advantage results of 0.243, 0.238, 0.228 and 0.236 respectively has a medium effect on cost reduction, differentiation, growth and quality. Moreover, it was found that top management support results of 0.184, 0.182, 0.173 and 0.179 respectively has a medium effect on cost reduction, differentiation, growth and quality , On the other hand, the firm size results of 0.006, 0.009, 0.007 and 0.010 respectively has an extremely weak effect on cost reduction, differentiation, growth and quality. Besides, the results of 0.103, 0.101, 0.096 and 0.100 respectively indicated that competitive pressure has a small effect on cost reduction, differentiation, growth and quality. Also, the results of 0.118, 0.116, 0.109 and 0.114 respectively showed that government support has a small effect on cost reduction, differentiation, growth and quality. .

Figure 5-3: level 2



5.5.2.2.2 Structural model for level 2: Egyptian context

For the Egypt sample, relative advantage and competitive pressure have positive effects on level 2 of adoption, (β=0.25, P<.02) and (β=0.40, P<.01) respectively. However, compatibility, complexity, top management support, Firm size, business partner pressure and government support have insignificant impact on level 2 of adoption. Consequently, these results support hypotheses H2, H2a, H10 and H10a. In contrast, these results reject hypotheses H2b, H2c, H6, H6a, H6b, H10b and H10c. Besides, the level 2 of adoption has a significant and positive impact on cost reduction (β=0.29, P<.01), differentiation (β=0.32, P<.01), growth (β=0.47, P<.01) and quality (β=0.37, P<.04). These results support hypotheses H17, H17a, H17b, H17c and H17d respectively.

For R^2, It was found that, together, relative advantage and competitive pressure explain 28% of the variance in level 2 of adoption. In addition, as shown in figure 5-4, the level 2 of adoption explains 8% of the variance in cost reduction, 10% of the variance in differentiation, 22% of the variance in growth, and 14% of the variance in quality.

Furthermore, the research's statistical analysis results show that the effect size for relative advantage and competitive pressure are 0.090 and 0.191 respectively. This provides evidence that competitive pressure is more impact than relative advantage on level 2 of adoption. The results illustrated, also, that, level 2 has a medium effect (0.219) on growth, but it has weak effect on cost reduction, differentiation and quality, 0.082, 0.100 and 0.139 respectively.

Table 5-33 shows that the Q^2-values for level 2, cost reduction; differentiation, growth and quality are above zero. These values provide evidence that the model has predictive validity.

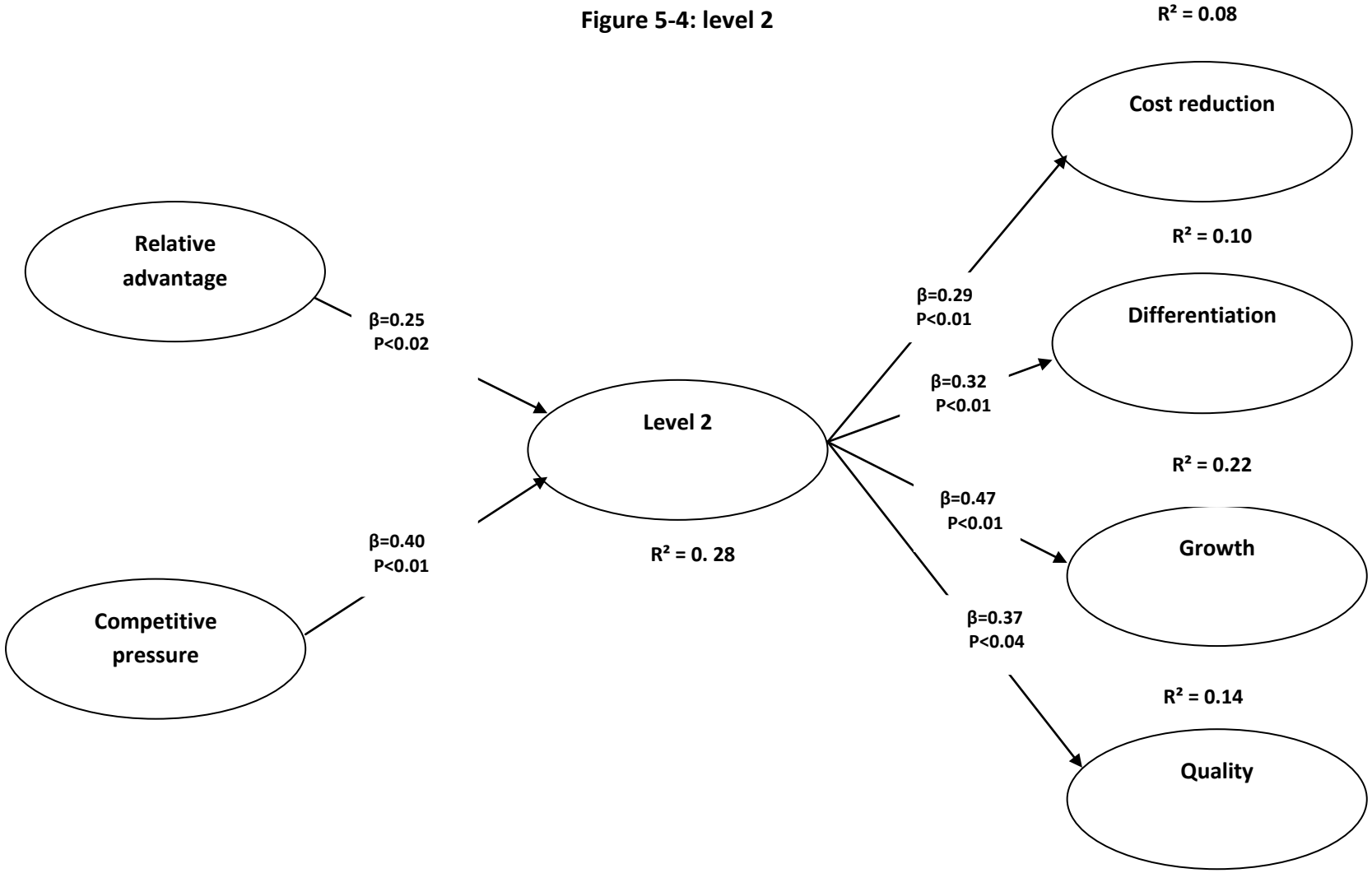
Table 5-33: Q-squared

Latent variable	**Q^2**
Level 2 of adoption	*0.28*
Cost reduction	*0.09*
differentiation	*0.10*
Growth	*0.22*
Quality	*0.14*

Q^2*: Q-squared coefficients*

In relation to the indirect effect of technological factors, organisational factors and environmental factors on competitive advantage, the results of study demonstrated that technological factors and organisational factors do not have a significant effect on competitive advantage. On the other hand, competitive pressure has a significantly positive effect on growth (β=0.188, P<.02). For effect size, the results of the study showed that the competitive pressure has small effect on growth which is 0.022. Thus, hypothesis: H24 can be supported. In contrast, hypotheses: H22 and H23 are rejected.

Figure 5-4: level 2



5.5.2.3 Structural model for level 3

5.5.2.3.1 Structural model for level 3: USA context

As illustrate in figure 5-5, relative advantage (β=0.32, P<.01), Top management support (β=0.37, P<.01), firm size (β=0.18, P<.01), business partner pressure (β=0.22, P<.03), and government support (β=0.34, P<.01) all have a positive effect on level 3 of adoption. On the other hand, compatibility, complexity and competitive pressure do not have a significant effect on level 3 of adoption. Besides, the level 3 of adoption has significant and positive impact on cost reduction (β=0.73, P<.01), differentiation (β=0.73, P<.01), growth (β=0.70, P<.01) and quality (β=0.72, P<.01). Consequently, these results support hypotheses H3, H3a, H7, H7a, H7b, H11, H11b, H11c, H18, H18a, H18b, H18c and H18d and, in contrast, reject hypotheses H3b, H3c and H11a.

According to R^2, It was found that, together, relative advantage; top management support, firm size, business partner pressure and government support explain 44% of the variance in level 3 of adoption. On the other hand, the level 3 of adoption explains 53% of the variance in cost reduction, 53% of the variance in differentiation, 49% of the variance in growth, and 52% of the variance in quality.

Moreover, the results showed that the effect size for relative advantage, top management, firm size, business partner pressure and government support are 0.238, 0.283, 0.022, 0.157 and 0.252 respectively. This provides indicators that relative advantage, top management support, business partner pressure and

government support have medium effect on level 3 of adoption. However, firm size has a weak effect on level 3 of adoption. Regarding the relationship between the level 3 of adoptions and competitive advantage, the results of 0.529, 0.533, 0.490, and 0.523 respectively showed that the level 3 of adoption has a large effect on cost reduction, differentiation, growth and quality.

Table 5-34 shows Q-squared coefficients (Q^2) values for level 3 of adoption, cost reduction, differentiation, growth and quality.

Table 5-34: Q-squared

Latent variable	**Q^2**
Level 3 of adoption	*0.42*
Cost reduction	*0.53*
differentiation	*0.53*
Growth	*0.49*
Quality	*0.52*

Q^2*: Q-squared coefficients*

As illustrate in Table 5-34, the values of Q^2 for level3 of adoption, cost reduction, differentiation, growth and quality being larger than zero. This means that research model has achieved predictive validity.

In relation to the indirect effect of technological factors on competitive advantage, the results showed that relative advantage has a positive effect on cost reduction (β=0.230, P<.01), differentiation (β=0.231, P<.01), growth (β=0.221, P<.01) and quality (β=0.229, P<.01). These results support hypothesis H22. Concerning the indirect effect of organisational factors on competitive advantage, it was found that

top management support has a positive effect on cost reduction (β=0.272, P<.01), differentiation (β=0.273, P<.01), growth (β=0.262, P<.01) and quality (β=0.270, P<.01). In addition to top management support, firm size has a significantly positive effect on cost reduction (β=0.128, P<.01), differentiation (β=0.128, P<.01), growth (β=0.123, P<.01) and quality (β=0.127, P<.01). These results validate hypothesis H23. For the indirect effect of environmental factor on competitive advantage, the results indicated that business partner pressure has a positive effect on cost reduction (β=0.161, P<.02), differentiation (β=0.162, P<.02), growth (β=0.155, P<.02) and quality (β=0.160, P<.02), and that government support has a positive effect on cost reduction (β=0.247, P<.01), differentiation (β=0.248, P<.01), growth (β=0.238, P<.01) and quality (β=0.246, P<.01). These results support hypothesis H24.

Regarding effect size (f^2), it was found from the results of 0.202, 0.198, 0.187 and 0.194 respectively that relative advantage has medium effect on cost reduction, differentiation, growth and quality. Moreover, top management support has a medium effect on cost reduction, differentiation, growth and quality for which the respective results are 0.229, 0.228, 0.214 and 0.222. However, the results of 0.006, 0.009, 0.008 and 0.010 respectively showed that firm size has a very weak effect on cost reduction, differentiation, growth and quality. Besides, the respective results of 0.103, 0.101 indicated that business partner pressure has a small effect on cost reduction and growth, whilst the respective results of 0.228 and 0.230 showed that business partner pressure has a medium effect on differentiation and quality. The respective results of 0.207, 0.206, 0.189 and 0.200 showed that government support has a medium effect on cost reduction, differentiation, growth and quality.

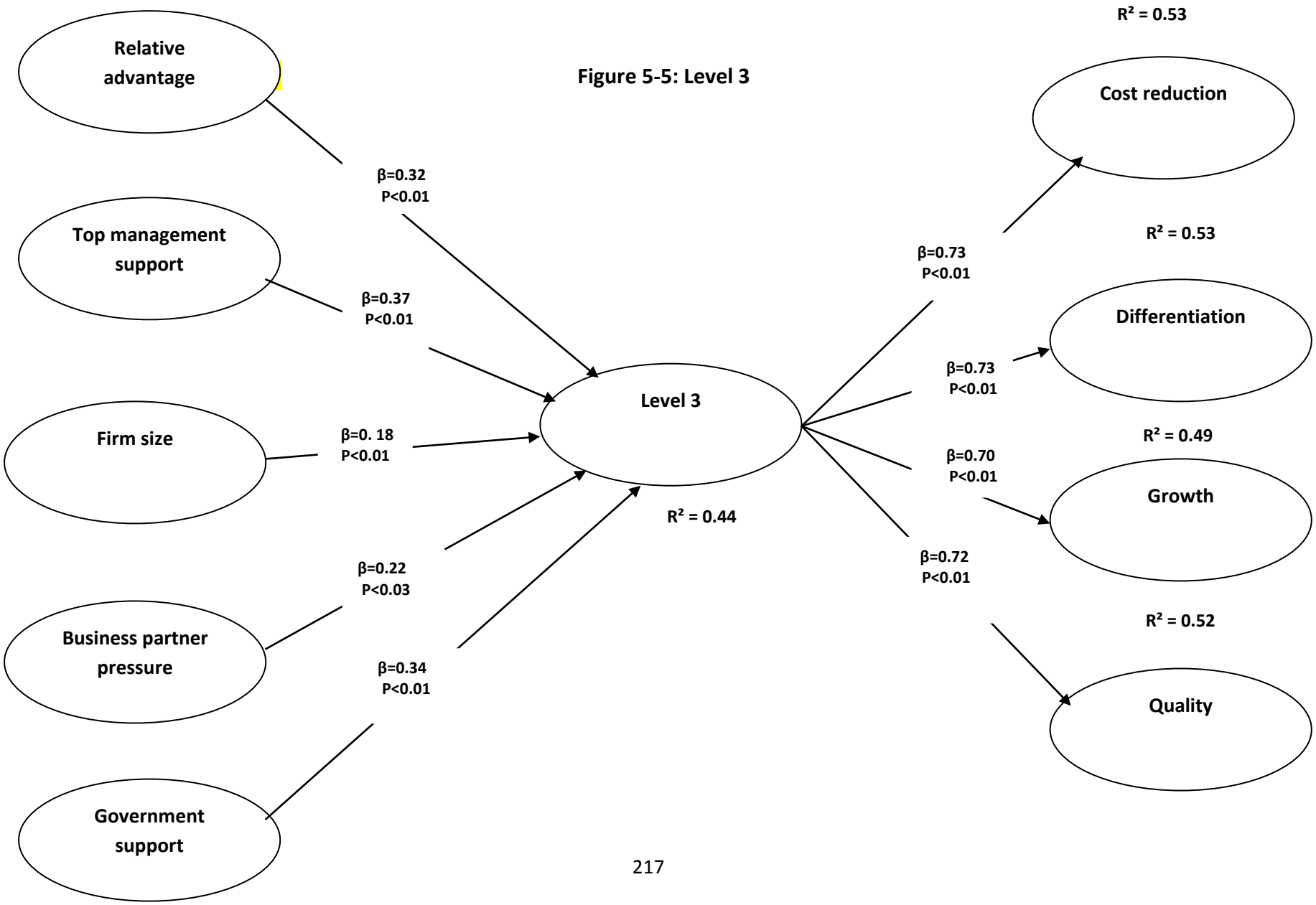


Figure 5-5: Level 3

5.5.2.3.2 Structural model for level 3: Egyptian context

The results showed the relative advantage (β=0.44, P<.01) and competitive pressure (β=0.48, P<.01) have a significant and positive impact on level 3 of adoption. On the other hand, as shown in figure 5-6, top management support (β= - 0.12, P<.03) and firm size (β=- 0.0 9, P<.04) have a negative effect on adopting level 3. With regard to compatibility, complexity, business partner pressure and government support, these have an insignificant impact on level 3 of adoption. Thereby, the results support hypotheses H3, H3a, H7, H7a, H7b, H11 and H11a, and reject hypotheses H3b, H3c H11b and H11c. Moreover, the level 3 of adoption has a significant and positive impact on cost reduction, differentiation, growth and quality, as shown in the respective results (β=0.35, P<.01), (β=0.38, P<.01), (β=0.41, P<.01) and (β=0.34, P<.04). Therefore, these results validate hypotheses H18, H18a, H18b, H18c and H18d.

The second point for refereeing structural model is R^2. It was found that, together, relative advantage, top management support, firm size and competitive pressure explain 52% of the variance in level 3 of B2B e-commerce adoption. On the other hand, the level 3 explains 12% of the variance in cost reduction, 15% of the variance in differentiation, 17% of the variance in growth, and 12% of the variance in quality.

Concerning effect size (f^2), the results of study indicated that the effect size for relative advantage, top management, firm size and competitive pressure are 0.240, 0.007, 0.004 and 0.276 respectively. These results mean that relative advantage and competitive pressure have a medium effect on level 3 of adoption. While the top

management and firm size has very weak effect on the level 3 of adoption. In addition, the respective results of 0.15 and 0.168 indicated that the level 3 of adoption has medium effect on differentiation and growth. However, the respective results of 0.122 and 118 showed that it has a weak effect on cost reduction and quality.

Table 5-35 reports the Q^2 in respect of the Level 3 of adoption, cost reduction, differentiation, Growth and Quality.

Table 5- 35: Q-squared

Latent variable	**Q^2**
Level 3 of adoption	0.52
Cost reduction	0.12
differentiation	0.15
Growth	0.18
Quality	0.12

Q^2*: Q-squared coefficients*

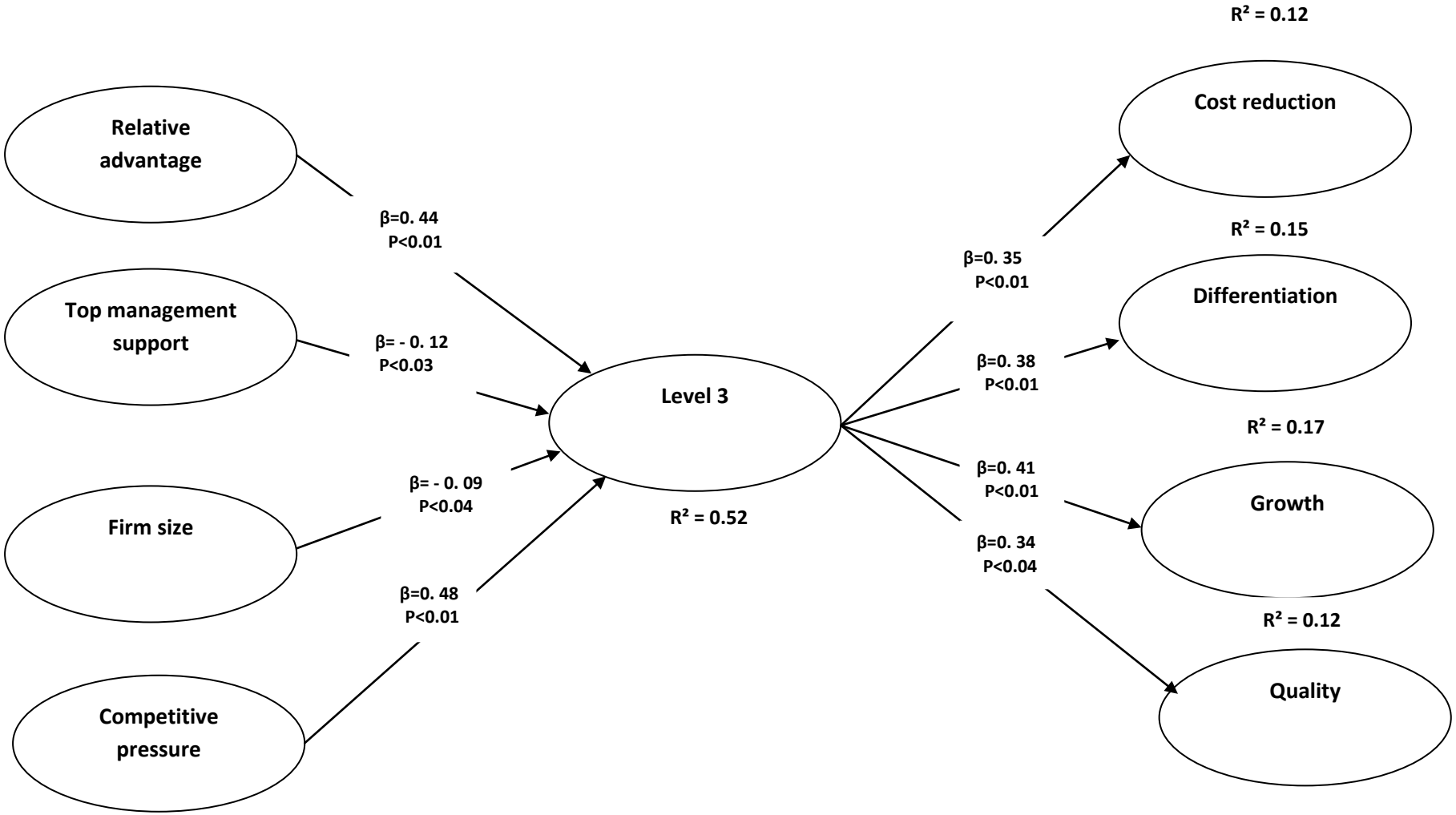
The values of Q^2 for level 3, cost reduction, differentiation, growth and quality are higher than zero as displayed in Table 5-35. This implies the research model has predictive validity.

With regard to the indirect effect of technological factors on competitive advantage, the results showed that relative advantage has a positive effect on cost reduction (β=0.152, P<.01), differentiation (β=0.166, P<.01), growth (β=0.178, P<.03) and quality (β=0.149, P<.04). These results support hypothesis H22. For the indirect effect of organisational factors on competitive advantage, it was found that the top management support has a negative effect on cost reduction (β= -0.042, P<.02),

differentiation (β= -0.045, P<.02) and growth (β= -0.049, P<.04). These results validate hypothesis H23. Furthermore, the indirect effect of environmental factors results on competitive advantage showed that competitive pressure has a positive effect on cost reduction (β=0.168 , P<.01), differentiation (β=0.184 , P<.01) and growth (β=0.197 , P<.01). These results supported hypothesis H24.

For effect size (f^2), it was found from the respective results of 0.024, 0.027, and 0.054 that relative advantage has a small effect on cost reduction, differentiation, and growth, whilst the result of 0.016 showed that it has a very weak effect on quality. Also, the respective results of 0.003, 0.003 and 0.004 showed that top management support has a very weak effect on cost reduction, differentiation and growth. In addition, the respective results of 0.039,0.043 and 0.023 showed that competitive pressure has a small effect on cost reduction, differentiation and growth.

Figure 5-6: Level 3



5.5.2.4 Structural model for level 4

5.5.2.4.1 Structural model for level 4: USA context

The study's results revealed that relative advantage has a positive effect on level 4 of adoption (β=0.32, P<.01), as do top management support (β=0.37, P<.01), the firm size (β=0.19, P<.01), business partner pressure (β=0.22, P<.03), and government support (β=0.34, P<.01). However, compatibility, complexity and competitive pressure do not have a significant effect on level 4 of adoption. Moreover, the level 4 has a significantly positive effect on cost reduction (β=0.73, P<.01), differentiation (β=0.73, P<.01), growth (β=0.70, P<.01) and quality (β=0.73, P<.01). Consequently, these results support hypotheses H4, H4a, H8, H8a, H8b, H12, H12b, H12c, H19, H19a, H19b, H19c and H19d. In contrast, these results reject hypotheses H4b, H4c and H12a.

For R^2, It was found that, together, relative advantage; top management support, firm size, business partner pressure and government support explain 46% of the variance in level 4 of adoption. In addition, the level 4 of adoption explains 54% of the variance in cost reduction, 54% of the variance in differentiation, 50% of the variance in growth, and 53% of the variance in quality.

In addition to R^2, the results show that the effect size for relative advantage, top management, firm size, business partner pressure and government support are 0.246, 0.287, 0.026, 0.159 and 0.258 respectively. These results provide indicators that the relative advantage, top management support, business partner pressure

and government support have medium effect on level 4 of adoption. However, the firm size affects level 4 of adoption weakly. As regards the relationship between the level 4 of adoption and competitive advantage, the respective results of 0.536, 0.536, 0.496, and 0.528 showed that the level 4 has a large effect on cost reduction, differentiation, growth and quality.

Table 5-36 shows that, the Q^2-values in respect of level 4 of adoption, cost reduction, differentiation, growth and quality are above zero. These values provide evidence that the model has predictive validity.

Table 5-36: Q-squared

Latent variable	**Q^2**
Level 4 of adoption	*0.44*
Cost reduction	*0.54*
differentiation	*0.53*
Growth	*0.50*
Quality	*0.53*

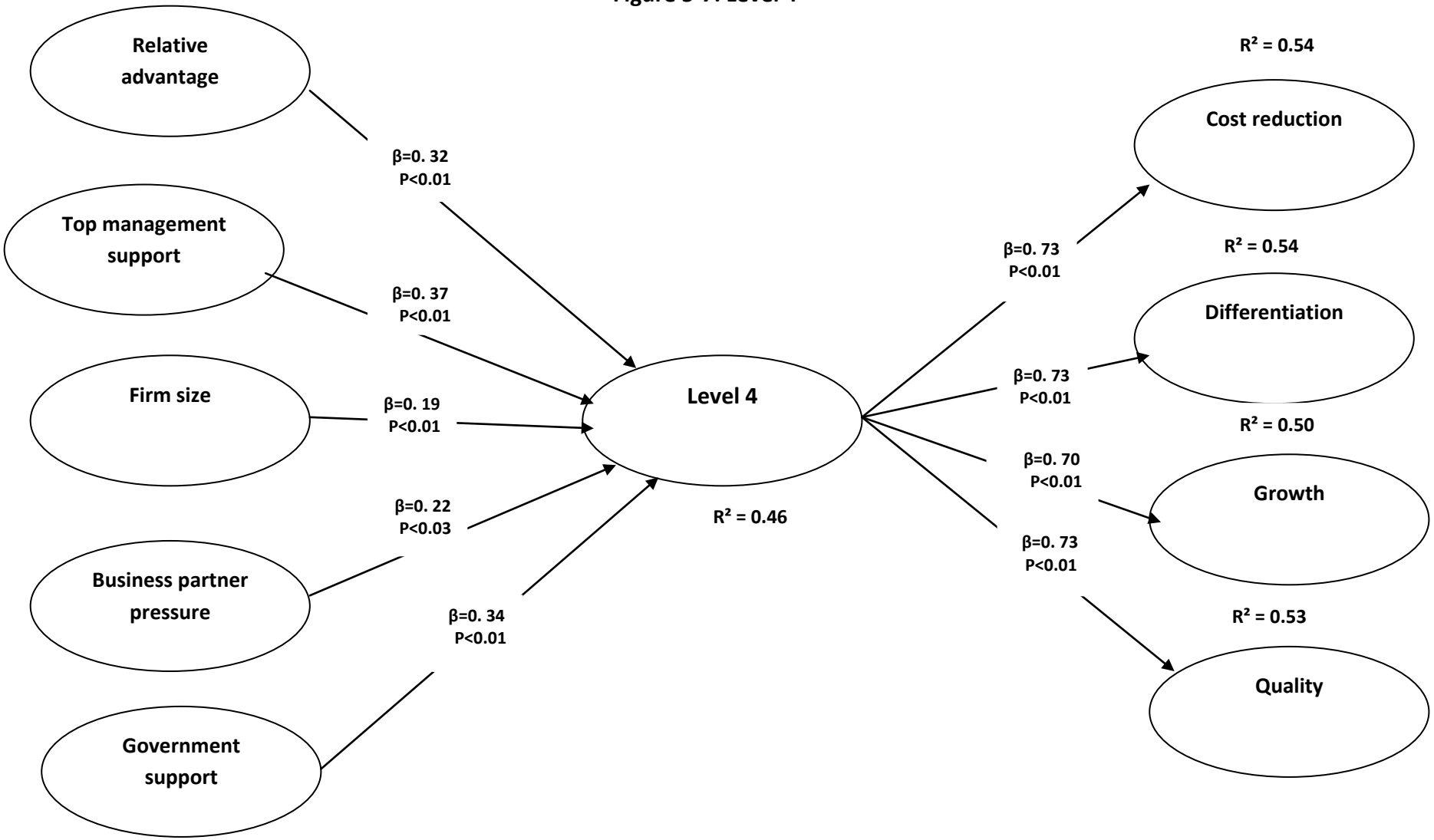
Q^2*: Q-squared coefficients*

With regard to the indirect effect of technological factors, organisational factors and environmental factors on competitive advantage through level 4 of adoption, the results reveal that relative advantage has a positive effect on cost reduction (β= 0.236, P<.01), differentiation (β=0.236 , P<.01), growth (β=0.227 , P<.01) and quality (β=0.234 , P<.01). These results support hypothesis H22. Top management support has a positive effect on cost reduction (β=0.274 , P<.01), differentiation (β=0.274 , P<.01), growth (β=0.264 , P<.01) and quality (β=0.272 , P<.01); and firm size has significantly positive effect on cost reduction (β=0.138 , P<.01), differentiation (β=

0.138, P<.01), growth (β=0.133 , P<.01) and quality (β=0.137 , P<.01). These results validate hypothesis H23. Business partner pressure has a positive effect on cost reduction (β=0.162 , P<.03), differentiation (β=0.162 , P<.03), growth (β=0.156 , P<.03) and quality (β=0.161 , P<.03); and government support has a positive effect on cost reduction (β=0.252 , P<.01), differentiation (β=0.252 , P<.01), growth (β= 0.243, P<.01) and quality (β=0.250 , P<.01). These results support hypothesis H24.

With regard to effect size (f^2), it was found, from the respective results of 0.207 0.203, 0.192 and 0.199, that relative advantage has a medium effect on cost reduction, differentiation, growth and quality. Moreover, it was found, from the respective results of 0.231,0.229 , 0.216 and 0.223, that top management support has a medium impact on cost reduction, differentiation, growth and quality. However, it was found, from the respective results of 0.007, 0.010, 0.008 and 0.011, that firm size has a very weak effect on cost reduction, differentiation, growth and quality. Besides that, the results indicate that business partner pressure has small effect on cost reduction and growth, 0.103, 0.101 respectively, while it has medium effect on differentiation and quality, 0.228, 0.230 respectively. Also, the respective results of 0.211, 0.210, 0.193 and 0.203 show that government support has a medium effect on cost reduction, differentiation, growth and quality. .

Figure 5-7: Level 4



5.5.2.4.2 Structural model for level 4: Egyptian context

With regard to the Egypt sample, the results showed that relative advantage (β=0. 35, P<.03) and competitive pressure (β=0.46, P<.01) have a significant and positive impact on level 4 of adoption. However, as shown in figure 5-8, complexity (β= - 0.15, P<.02) and top management support (β= - 0.16, P<.02) have a negative effect on the level 4 of adoption. With regard to compatibility, firm size, business partner pressure and government support, these do not have a significant impact on level 4 of adoption. Moreover, the respective results showed that the level 4 of adoption has a significant and positive effect on cost reduction, differentiation, growth and quality, (β=0.34, P<.01), (β=0.38, P<.01), (β=0.44, P<.01) and (β=0.36, P<.04). Therefore, these results support hypotheses H4, H4a, H4c, H8, H8a, H12, H12a, H19, H19a, H19b, H19c and H19d and, in contrast, reject hypotheses H4b, H8b, H12b and H12c.

Moreover, it was found that, together, relative advantage; complexity, top management support and competitive pressure explain 45% of the variance in level 4. On the other hand, as presented in figure 5-8, the level 4 explains 12% of the variance in cost reduction, 14% of the variance in differentiation, 19% of the variance in growth, and 13% of the variance in quality.

For effect size (f^2), the respective research results of 0.180 and 0.256 showed that the relative advantage and competitive pressure have medium effect on level 4. As regards complexity and top management, the respective results of 0.006 and 0.01 showed that these have a very weak effect on the level 4 of adoption. In addition,

the results show that the level 4 has medium effect on differentiation and growth, 0.15, and 0.194 respectively, while it has weak effect on cost reduction and quality, 0.115 and 0,131 respectively.

The main result of Q^2- values for level 4, cost reduction, differentiation; Growth and Quality are displayed in Table 5-37.

Table 5-37: Q-squared

Latent variable	**Q^2**
Level 4 of adoption	0.45
Cost reduction	0.12
differentiation	0.15
Growth	0.21
Quality	0.13

Q^2*: Q-squared coefficients*

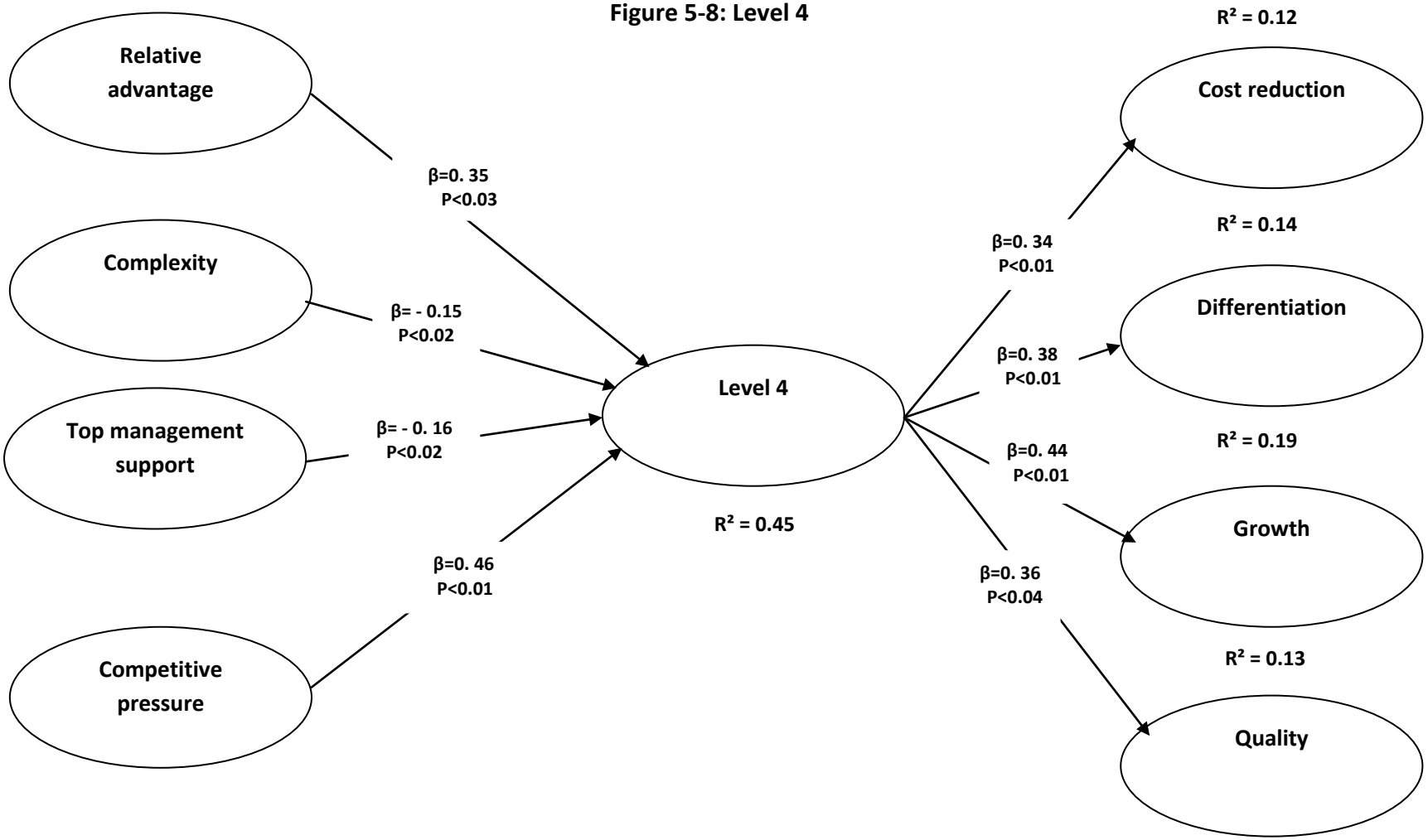
The Q^2 values in respect of level 4, cost reduction, differentiation, growth and quality are higher than zero as displayed in Table 5-37. This implies the research model has predictive validity.

With regard to the indirect effect of technological factors, organisational factors and environmental factors on competitive advantage through level 4 of adoption, it was found that relative advantage has a positive effect on cost reduction (β=0.120 , P<.02), differentiation (β0.134 , P<.02), growth (β=0.156 , P<.04) and quality (β= 0.128, P<.04); and complexity has a negative effect on cost reduction (β= -0.049 , P<.04) and differentiation (β= -0.055 , P<.04). These results supported hypothesis

H22. Also, top management support has a negative effect on cost reduction (β= -0.054, P<.01), differentiation (β= -0.061, P<.01) and growth (β= -0.071, P<.02). These results validated hypothesis H23. In addition, competitive pressure has a positive effect on cost reduction (β=0.155 , P<.01), differentiation (β=0.173 , P<.01) and growth (β=0.202 , P<.01). These results supported hypothesis H24.

For effect size (f^2), it was found, from the respective results of 0.020, 0.023 and 0.033, that relative advantage has a small effect on cost reduction, differentiation, growth, whilst it has very weak effect on quality which is 0.009, complexity has very weak effect on cost reduction and differentiation, 0.002 and 0.002 respectively. Also, the respective results of 0.004, 0.004 and 0.005 showed that top management support has a very weak effect on cost reduction, differentiation and growth. In addition, the respective results of 0.036, 0.041 and 0.024 showed that competitive pressure has a small effect on cost reduction, differentiation and growth. .

Figure 5-8: Level 4



5.6 Model fit indices

As provided by Warp PLS 3.0 software (Kock, 2012), the researcher measured model fit by using the following three criteria: Average Path Coefficient (APC); Average R-Squared (ARS); and Average Variance Inflation Factor (AVIF). Also, P values are provided to Average Path Coefficient (APC) and Average R-Squared (ARS). It is recommended that if the P values for both APC and ARS are lower than 0.05 and the AVIF is less than 10; these suggest that the model has a good fit with the data (Kock, 2010). With regard to this study, Table 5-38 shows that the fit indices meet these criteria and, hence, suggests that both the American and Egyptian models fitted with the data.

Table 5-38: Model fit indices

Indices		***APC***	***ARS***	***AVIF***
USA	*Model of level 1 of adoption*	*0.48**	*0.44**	*4.22*
	Model of level 2 of adoption	*0.45**	*0.46**	*3.13*
	Model of level 3 of adoption	*0.48**	*0.50**	*4.40*
	Model of level 4 of adoption	*0.48**	*0.51**	*4.45*
Egypt	*Model of level 1 of adoption*	*0.31**	*0.14**	*1.08*
	Model of level 2 of adoption	*0.35**	*0.17**	*1.10*
	Model of level 3 of adoption	*0.33**	*0.22**	*1.12*
	Model of level 4 of adoption	*0.34**	*0.22**	*1.21*

APC: average path coefficient, ARS: average R-squared, AVIF: average variance inflation factor

5.7 T-test

Obtained by using a t-test, Table 5-39 shows the differences in the levels of competitive advantage gained by the American and Egyptian SMEs.

Table 5-39: Differences between the competitive advantages gained by American and Egyptian SMEs (T-test results)

Paths	β1	S.E.1	Eff. Size		β2	S.E.2	Eff. Size		p value
Level1→cost reduction	0.281	0.100	0.08	S	0.690	0.032	0.45	L	<0.05
Level1→differentiation	0.284	0.101	0.08	S	0.692	0.031	0.48	L	<0.05
Level1→growth	0.472	0.131	0.22	M	0.680	0.034	0.48	L	0.062
Level1→quality	0.268	0.197	0.07	S	0.693	0.028	0.48	L	<0.05
Level2→cost reduction	0.287	0.096	0.08	S	0.391	0.035	0.45	L	0.15
Level2→differentiation	0.316	0.110	0.10	S	0.689	0.035	0.48	L	<0.05
Level2→growth	0.468	0.143	0.22	M	0.673	0.037	0.45	L	0.08
Level2→quality	0.373	0.206	0.14	S	0.690	0.032	0.48	L	0.06
Level3→cost reduction	0.349	0.085	0.12	S	0.727	0.034	0.53	L	<0.05
Level3→differentiation	0.382	0.085	0.14	S	0.730	0.034	0.53	L	<0.05
Level3→growth	0.410	0.155	0.17	M	0.700	0.035	0.49	L	<0.05
Level3→quality	0.343	0.198	0.12	S	0.723	0.032	0.52	L	<0.05
Level4→cost reduction	0.339	0.087	0.05	S	0.732	0.032	0.54	L	<0.05
Level4→differentiation	0.378	0.087	0.14	S	0.732	0.032	0.54	L	<0.05
Level4→growth	0.440	0.164	0.19	M	0.704	0.034	0.50	L	0.06
Level4→quality	0.362	0.201	0.13	S	0.726	0.031	0.53	L	<0.05

Note: S.E: standard error, Eff. size: effect size, S: small, M: medium, L: large

Table 5-39 shows that SMEs in the USA and Egypt achieve different levels of competitive advantage as a result of adopting B2B e-commerce, except in terms of growth at level1; cost reduction, growth and quality at level2; and growth at level 4, where they achieved almost the same level of competitive advantage. These findings show that, in both countries, the SMEs focused on growth and considered this to be the most valuable form of competitive advantage, followed by quality concerns and cost reduction. Based on the effect sizes (Kock, 2012), it is found that the B2B e-commerce adoption level has a medium-sized effect on growth in Egyptian SMEs and a large effect on all forms of competitive advantage in US SMEs.

It is clear that SMEs focus on achieving competitive advantages relating to customer services and satisfaction. Strategically, SMEs are interested in achieving a high

quality of service, penetrating new markets and expanding their market share so as to achieve growth and provide a better service. They also want to enable customers to customize their services, and want to replace their traditional methods of doing business with electronic methods in order to reduce costs and improve their distribution channels. Overall, Egyptian SMEs do not use the full capabilities of B2B e-commerce and therefore the level of competitive advantage they achieve is still low. Capabilities, resources, cultural concerns, and organisational readiness are most likely to be behind the modest level of adoption of B2B e-commerce. Awareness of the potential of e-commerce could give enterprises the incentive to upgrade their adoption level and so increase their competitive advantage in terms of cost reductions, differentiation of products and services, growth and expansion, by increasing their quality of services and products, and the way they produce and deliver them.

5.8 Summary

This chapter described the responses of the study's samples in both the USA and Egypt. The measurement model comprised tests of reliability, convergent validity, discriminant validity, and multicollinearity. Also, the researcher assessed the structural model. In addition, the results of study revealed that the research models fit with data. T-test showed that there is a significant difference in the levels of competitive advantage gained by the USA and Egyptian SMEs.

Chapter 6: Discussion of findings

6.1 Introduction

6.2 Factors affecting the levels of B2B e-commerce adoption

6.2.1 Factors affecting the levels of B2B e-commerce adoption in USA manufacturing SMEs

6.2.2 Factors affecting the levels of B2B e-commerce adoption in Egyptian manufacturing SMEs

6.3 Level of B2B e-commerce adoption in manufacturing SMEs

6.4 Levels of B2B e-commerce adoption and competitive advantage

6.5 Indirect impacts of technological, organisational and environmental factors on competitive advantage

6.6 Summary

6.1 Introduction

This chapter discusses the findings of the study, as presented in chapter 5. Based on the study's objectives, this chapter discusses the levels of B2B e-commerce adoption by manufacturing SMEs; their impacts on competitive advantage; and the significant factors which influence each level of B2B e-commerce adoption in the USA and Egypt. In addition, the study discusses the indirect impact of technological, organisational and environmental factors on competitive advantage.

6.2 Factors affecting the levels of B2B e-commerce adoption

This section covers the first objective of the study recognizing the factors affecting levels of B2B e-commerce adoption. The results showed that, regardless of their environments, the technological factors, organisational factors, and environmental factors affected the SMEs' adoption levels of B2B e-commerce. Moreover, the results confirmed that factors, which influence each level of B2B e-commerce adoption, are different in both the USA and Egypt. Besides, the factors affecting the USA manufacturing SMEs' adoption levels of B2B e-commerce are different from those affecting the Egyptian manufacturing SMEs' adoption levels of B2B e-commerce. These support hypotheses H13 and H14.

6.2.1 Factors affecting the levels of B2B e-commerce adoption in USA manufacturing SMEs

-Technological factors

The results of this study indicate that relative advantage has a positive and significant effect on the 1, 2, 3 and 4 adoption levels. This is explained as the relative advantage, which could be obtained from adopting B2B e-commerce, is a main driver of American manufacturing SMEs' adoption/different levels of B2B e-commerce. USA manufacturing SMEs adopt different levels of B2B e-commerce as they gain benefits of adoption such as increasing productivity and effectiveness, and enable them to accomplish tasks more quickly. This finding follows the logic that SMEs adopt processes they perceive it will be useful for their business.

Moreover, these findings supported previous studies by Acılar and Karamaşa (2010) and Bigne-Alcaniz et al. (2009) who found that relative advantage is a main reason for an SME adopting e-commerce. Additionally, the literature review of the factors affecting SMEs adoption of IT showed that relative advantage was the most significant factor (i.e.,Khemthong and Robert, 2006). In addition, these results go in line with the findings of Premkumar and Roberts (1999) and Grandon and Pearson (2004) who found that relative advantage had a strong effect on the American SMEs' usage of IT and adoption of e-commerce as well as the finding of Iacovou et al. (1995).

Moreover, compatibility is another technological factor. This study's results reveal that compatibility is the second factor affecting level 1 adoption of B2B e-commerce; this has a positive and significant effect on level 1 adoption. This means that compatibility of the B2B e-commerce with the existing set of values and information infrastructure is important factor in the adoption of level 1 by USA manufacturing SMEs.

In addition, in their study, Teo et al. (1998) stated that the higher the compatibility the less change or adjustment was needed and the lower the possible level of resistance to the technology when it was adopted. This is in line with Zhu et al.'s (2006) and Al-Qirim (2007) studies which found that compared to the other features of innovation, compatibility was the strongest driver in the adoption of e-commerce.

Meanwhile, compatibility has an insignificant impact on adoption level 2, 3 and 4; this support hypothesis H13 and provides statistical results to ensure that different factors affect American manufacturing SMEs' adoption of each level of B2B e-commerce. In addition, these results indicate that in order to gain a high competitive advantage, American manufacturing SMEs are ready to use and adopt incompatible technology with their existing information infrastructure.

For the complexity of B2B e-commerce, the results of study indicate that complexity has an insignificant effect on adoption levels 1, 2, 3 and 4. Although a negative relationship was expected to exist between complexity and levels of B2B e-commerce adoption. This is explained by the fact that American manufacturing SMEs

use complex technology to gain benefits from B2B e-commerce adoption. These findings supported previous studies by Davis (1989) and Davis et al. (1989) who found that the perceived usefulness is more strongly linked to IT adoption than perceived ease of use because the organisations might be willing to adopt and make use of more complicated technology in order to gain the benefits from adopting IT.

In addition, this result is different from that of Al-Qirim (2007) who found that complexity had a negative impact on the adoption of e-commerce. However, it is consistent with Premkumar and Roberts' (1999) findings that complexity did not have a significantly negative effect on American SMEs adopting new IT.

- Organisational factors

The results of study show that top management support has a significantly positive influence on adoption levels 1, 2, 3, and 4. These indicate the important role played by American manufacturing SMEs' owners/managers in adopting a high level of B2B e-commerce in their companies. Top management's positive attitude and commitment to the B2B e-commerce is essential, especially in SMEs, to allocate adequate resources and support to implement the B2B e-commerce. Top management's commitment of SMEs is also important to overcome the resistance to change. In SMEs it is likely that the owner/manager may be the top management and if they are not persuaded of the B2B e-commerce it is very unlikely to be adopted.

These findings support the previous studies by Fink (1998) and Tongy and Yap (1999) and Gagnon et al. (2000) who found that SME`s owners/ managers, having a positive attitude towards IT, might adopt new technology easily into their organisations. In addition, These results go in line with the findings of Lip-Sam and Hock-Eam (2011) who found that owners-manager of SMEs have important role to adopt high level of B2B e-commerce. It is, also, goes in line with the Premkumar and Roberts' (1999) findings that top management support was an important determinant in American SMEs' adopting IT.

In addition, firm size is another significant organisational factor for B2B e-commerce adoption in USA manufacturing SMEs. The results of the study reveal that firm size has positive impact on adoption levels 1, 2, 3, and 4. This is explained by the fact that larger firms have the resources to invest in technologies and employ qualified staffs. This result is in line with Premkumar and Roberts (1999) and Dholakia and Kshetri (2004) who found that firm size had positive impact on e-commerce adoption in USA SMEs. Based on data collected from 3,103 firms, Zhu et al. (2003) found that there was an expectation that larger firms were more possible to implement e-business.

- Environmental factors

It is somewhat surprising that with the exception of level 2, competitive pressure has an insignificant impact on adoption levels of B2B e-commerce. The explanation for this might be that American manufacturing SMEs see that the B2B e-commerce is essential to reduce costs; to improve the quality of goods and service; to grow their market share and revenues; and, regardless competitive pressure, to facilitate their

business. Besides, maybe USA manufacturing SMEs are more sensitive towards pressure from trading partners than competitors because they are more likely to be dependent economically on their trading partners for continued existence.

This result is different from that of Sila and Dobni (2012), who found that competitive pressure had the highest effect on the American SMEs' usage of B2B e-commerce as well as the findings of Wen and Chen (2010), Grandon and Pearson (2004) and Premkumar and Roberts (1999), but is consistent with the findings of Thong (1999), who found that environment pressure has not direct impact on SMEs adoption of IS.

Moreover, pressure from business partner is another significant environmental factor for B2B e-commerce adoption in SMEs. This study's results indicate that business partner pressure has an insignificant impact on adoption level 1 and 2. It could be explained that, regardless of the environmental pressure, level 1 and 2 of B2B e-commerce comprise of implementations which are important to facilitating the manufacturing business processes. On the other hand, it has positive and significant effect on adoption levels 3 and 4. This is explained by the fact that American SMEs adopt high levels of B2B e-commerce in order to satisfy their suppliers and clients. In addition, this study concluded from the results that American manufacturing SMEs are weaker to pressure from trading partner than competitors since, for their survival, they are likely to be dependent economically on their trading partner. Maybe this is one reason for American SMEs being successful.

These findings are in line with Min and Galle (1999) who found that buyers using e-commerce heavily more likely to affect their suppliers to adopt e-commerce. These findings are in line, also, with Iacovou et al.'s (1995) who found that the essential factors, which might have a powerful effect on Canadian SMEs adopting EDI, was external pressure from suppliers and business partners as well as the findings of Al-Qirim (2007). This conclusion supports hypothesis H13 and the statistical results confirm that each level of B2B e-commerce adoption is affected by different factors from other level.

In the environmental context, the final factor is government support. The results of this study indicate that government support has a positive and significant effect on American manufacturing SMEs' adoption levels 1, 2, 3 and 4 of B2B e-commerce. This indicate that the American government's role is essential in terms of the support it provided through appropriate and adequate infrastructure; regulations; policies and training; and maintaining a suitable IT workforce aimed at supporting and encouraging SMEs to adopt B2B e-commerce from the first level to the advance level. American government support for different business sectors has made it a most important economy not only in the developed countries but, also, globally. It might be that this government support is one of the main reasons behind American SMEs being successful. This result is consistent with those of Premkumar and Roberts (1999) and Zhu and Thatcher (2007) who found that government support had a positive impact on the adoption of IT (e.g. Internet, e-commerce).

In addition, Gibbs et al. (2003) cited that e-commerce was affected greatly by government incentives and national policies like trade and telecommunication liberalisation and, also, by government promotions. The results of Zhu and Thatcher's (2007) study indicated that governmental encouragements represented the most powerful facilitators at the beginning of the adoption of B2B e-commerce.

6.2.2 Factors affecting the levels of B2B e-commerce adoption in Egyptian manufacturing SMEs

- Technological factors

Technological factors are considered to be one of the most important factors which affect developing countries' adoption of IT (Elbeltagi et al., 2013). The results of the study found that relative advantage has a positive and significant effect on adoption levels 1, 2, 3 and 4. This is explained that, regardless the business environment, the benefits, which could be obtained from adopting B2B e-commerce, is a driver of the adoption. These findings are in line with Abou-Shouk (2012) who found that, in studying Egyptian SMEs, relative advantage had a positive and significant effect on the adoption of e-commerce as well as the findings of Ching and Ellis (2004), and Ghobakhloo et al. (2011). However, these results are different from those of El-Gohary (2012) who found that relative advantage had an insignificant impact on Egyptian small tourism organisations adoption of e-Marketing.

On the other hand, compatibility has insignificant impact on Egyptian manufacturing SMEs 'adoption of level 1, 2, 3, and 4 of B2B e-commerce. This could be explained by

the fact that, although they adopt low levels of B2B e-commerce, it is important for Egyptian manufacturing SMEs regardless of whether or not these technologies are compatible with their existing IT infrastructures. This result is different from that of El-Gohary (2012) who found that compatibility was the most important factor affecting the Egyptian small tourism companies' adoption of E-Marketing. This is, also, disagree with the findings of Ching and Ellis (2004), Ghobakhloo et al. (2011). However, it is consistent with the findings of Elbeltagi et al. (2013) who found that compatibility had insignificant impact on ICT adoption by SMEs in United Arab Emirates (UAE).

For complexity, the results of study indicate that, although a negative relationship was expected to exist between complexity and the B2B e-commerce adoption, it has an insignificant impact on adoption levels 1 and 2 of 4 of B2B e-commerce. Meanwhile, it has a significant impact on adoption level 3. This result goes in line with the findings of Abou-Shouk (2012) who found that it was not easy for Egyptian SMEs` staff to use e-commerce. It also in consistent with the findings of Ching and Ellis (2004) who found that complexity had significant impact on e-commerce adoption by SMEs in Hong Kong. Moreover, these results support hypothesis H13 and provided statistical evidence that different factors affected each level of B2B e-commerce.

- Organisational factors

Regarding organisational factors, the study's results indicate that top management support factor has an insignificant impact on adoption levels 1 and 2. However, it has

a negative influence on Egyptian manufacturing SMEs' adoption of levels 3 and 4 of B2B e-commerce. Again, this result support hypothesis H13 and provide statistical results that different factors affected each level of B2B e-commerce. This result is different from that of Chong et al. (2011) who found that top management support had positive effect on adoption of B2B e-commerce by Chinese SMEs as well as the findings of Ghobakhloo et al. (2011), Wan and Lin (2009), Chen and McQueen (2008) and Lip-Sam and Hock-Eam (2011).

There are several possible explanations for these results. The first explanation is that, at the advanced levels such as level 3 and 4, the features of the adopted technology are irrelevant or inappropriate to the nature of the Egyptian manufacturing SMEs' processes. Therefore, the manufacturing SME's owners/ managers have a negative attitude toward level 3 and 4. This viewpoint appeared in the study by Kartiwi and MacGregor (2007) who found that e-commerce was inappropriate for some Indonesian SMEs' types of business, products or services. Also, in his study, Abou-Shouk (2012) found that some Egyptian travel agents did not adopt the advance level of e-commerce because these travel agents' owners/ mangers of thought e-commerce was unsuitable for some types of customer such as religious tours since, typically, they sought personal contact and advice.

The second possible explanation might be that the owners/ managers have negative attitude towards adopting a high level of B2B e-commerce because they see that the Egyptian business environment does not have appropriate and adequate infrastructure. In his study, Zaied (2012) found that poor infrastructure was the main

barrier for Egyptian SMEs adopting e-commerce. In addition, in his study, AlGhamdi et al., (2011) reported that an insufficient infrastructure was a barrier to Saudi Arabia adopting e-commerce. The third explanation is the lack of skilled labour; this explanation is consistent with extant studies mentioning that the lack of skilled labour was a major challenge to Egyptian SMEs adopting e-commerce (Abou-Shouk, 2012, Zaied, 2012).

The fourth explanation consisted of Egyptian manufacturing SMEs' lack of awareness of the advantages of adopting B2B e-commerce. WTO (2013) reported that, in developing countries, most SMEs' owners/manager lacked the necessary skills and awareness to take full advantage of e-commerce and ICT.

The fifth explanation is that the Egyptian manufacturing SMEs' owners/mangers do not like to take risks because they believed there is no guarantee that they would obtain a return on any investment on technology. This doubt, in relation to the benefits of adopting e-commerce (Kim, 2006) made the SMEs unwilling to take risks. The sixth and final explanation is the Egyptian SMEs have very low capital (El-Mahdi, 2012, Ghanem, 2013).

In relation to firm size, it is found that firm size has an insignificant impact on adoption level 1, 2 and 4, whilst it has a negative impact on level 3. This support hypothesis H13, and the current study's view that different factors affected each level of B2B e-commerce. One unanticipated finding was that, although a positive relationship was expected to exist between firm size and B2B e-commerce adoption,

firm size has negative impact on adoption level 3. This result might be explained by the fact that Egyptian manufacturing SMEs relied more on their employees than on technological equipment. This might be because their clients do not trust B2B e-commerce transactions, either considering them insecure or they preferred to deal more in traditional buying ways than online.

Abou-Shouk (2012) cited that the Egyptian travel agents' owners/managers mentioned that their clients preferred to stick to '*traditional buying habits'*. In addition, Halaweh (2011) found that in Jordan, companies and customers did not trust e-commerce transactions. This result is different from that of El-Gohary (2012) who found that firm size had positive effect on E-Marketing adoption by Egyptian SMEs. However, it is consistent with the findings of Wen and Chen (2010) who found that firm size had a negative impact on e-business adoption.

- Environmental factors

In relation to environmental factors, the results of study indicate that competitive advantage has a positive and significant impact on Egyptian SMEs' adoption levels 1, 2, 3 and 4 of B2B e-commerce. This indicates that Egyptian manufacturing SMEs responded to pressure from competitors because they believe that they would lose their customers to their competitors if they do not adopt B2B e-commerce. Besides, they consider that, to compete in the marketplace, it is a strategic necessity to use B2B e-commerce. This result goes in line with the findings of Abou-Shouk (2012) who found that competitive pressure had a significant positive effect on Egyptian SMEs' adoption of e-commerce. It also goes in line with the findings of El-Gohary (2012)

who found that competitive pressure had a high positive impact on E-Marketing adoption by Egyptian enterprises as well as the findings of Ching and Ellis (2004), Ghobakhloo et al. (2011) and Chong et al. (2011).

At the same time, business partner pressure has an insignificant impact on Egyptian SMEs' adoption levels 1, 2, 3 and 4 of B2B e-commerce. This is despite it being expected that a positive relationship would exist between business partner pressure and the adoption of B2B e-commerce. There are some possible explanations for these results. The first explanation is that suppliers and clients do not demand manufacturing SMEs to use B2B e-commerce in doing business with them. Another possible explanation is that suppliers and clients do not use B2B e-commerce or used very basic levels. This result is in line with the findings of Abou-Shouk (2012) who found that supplier and partner pressures did not have a significant positive effect on Egyptian SMEs' adoption of e-commerce. However, these findings are different from those of Ching and Ellis (2004) and Ghobakhloo et al. (2011) who found that business partner pressure had a significant impact on the adoption of e-commerce by SMEs.

Moreover, the results of the study reveal that the government support has an insignificant effect on adoption levels 1, 2, 3, and 4; this could be explained by the fact that, through providing adequate infrastructure, law and legislations, the Egyptian government do not support SMEs in implementing, organising and protecting e-commerce activities in the business environment. The cause might have been that the Egyptian SMEs could not adopt high levels of B2B e-commerce and,

therefore, reduced their abilities to be competitive. In recent studies by Zaied (2012) and Abou-Shouk (2012), lack of infrastructures and legislations protecting e-commerce activities were regarded as main barriers to Egyptian SMEs adopting e-commerce. This result is consistent with Lawrence and Tar (2010) who found that a lack of a national governmental ICT strategy; a lack of satisfactory basic infrastructures were all significant obstacles to developing countries adopting e-commerce.

6.3 Level of B2B e-commerce adoption in manufacturing SMEs

This section covers the study's second objective which is to identify the actual adoption level of B2B e-commerce amongst manufacturing SMEs in both USA and Egypt. The results of the study revealed that the American manufacturing SMEs show significant responses on all eBPs in all four levels of B2B e-commerce adoption; this demonstrated the maturity of adoption amongst the American enterprises. Among the Egyptian companies, although the level 1 eBPs are similar to those of the USA companies, those at level 2, 3, and 4 differ, which support hypothesis H15.

The results, gained from the structural equation modelling, shown that, in adopting level 1 of B2B e-commerce, American and Egyptian manufacturing SMEs implemented all eBPs from that level. Level 1, 'electronic information search and creation', is classified as a beginner level and includes the following five eBPs: seeking out new suppliers; products/services; new customers; advertising the company/services; and digitalizing information about products. These results appeared somewhat in Abou-Shouk's (2012) previous research investigating

Egyptian SMEs' adoption of e-commerce. He found that the SMEs used the internet to search for customers and/or suppliers; to communicate with and respond to customers; to collect information about their competitors and customers; and to advertise about the company and its products and/or services.

Next level, the results indicate that the Egyptian firms have implemented only two eBPs from B2B e-commerce adoption level 2, it is clear that in this stage the Egyptian firms use the internet only for receiving/managing customer orders and offering after-sales services for customers. While, the USA enterprises have implemented all eBPs from B2B e-commerce adoption level 2. Stage 2, 'simple electronic transactions', is classified as the intermediate level of adoption and encompasses seven eBPs: accessing suppliers' product/service databases, placing/managing orders with suppliers, using electronic catalogues to buy products/services, accessing customers' product/service databases, receiving/managing customer orders, using electronic catalogues to sell products/services, and offering after-sales services for customers. Stage 2 included, also, stage 1.

At level 3, 'complex electronic transactions', is classified as an upper-intermediate level of B2B e-commerce adoption and comprises twelve eBPs: Stages 3 includes stages 1 and 2. In this stage, the Egyptian enterprises have implemented five compared to the US firms' twelve. The five eBPs used by both the USA and the Egyptian SMEs at this level are negotiating contracts with suppliers, allowing customers to access the company's inventory, accessing suppliers' inventories, selling products/services by responding to electronic calls for tender, and receiving

electronic payments from customers. However the USA firms additionally use the following seven: buying products/services by electronic auction, buying products/services by issuing electronic calls for tender, making electronic payments to suppliers, accessing customers' inventories, allowing suppliers to access the company's inventory, selling products/services by electronic auction and negotiating contracts (price, volume, and others) with customers.

At the last stage, 'electronic collaboration', it was revealed that SMEs in the Egypt adopt one process of B2B e-commerce, which is returns management. While, USA manufacturing SMEs have implemented all eBPs from B2B e-commerce adoption level 4. In this stage, the eBPs are as follows: transferring documents and technical drawings to suppliers, collaborating with suppliers on online engineering; transferring documents and technical drawings to customers; collaborating with customers on online engineering; integrating software supporting product design (e.g. CAD/CAM, VPDM); automating the production floor using a manufacturing execution system (MES); integrating the MES into the management information system; ensuring the management of quality assurance using the management information system; automating distribution/logistics using a logistics execution system (LES); allowing distribution/transportation partners to access the information they need (SKU, quantity turnaround, etc) in order to reduce distribution time and costs; optimizing returns management; and tracking sold or purchased products during transportation. The fourth stage included, also the first three stages and are classified as an advanced level of B2B e-commerce adoption.

These results reveal how far the Egyptian SMEs are behind their USA peers regarding B2B e-commerce adoption, which supports the hypothesis 15. These results are in line with a previous study by Zaied (2012) who found that Egyptian SMEs used only basic applications of e-commerce. Additionally, Abou-Shouk et al. (2012) found that Egyptian SMEs (travel agents) adopted low levels of e-commerce.

In addition, the difference could be a result of Egyptian SMEs lacking the resources, capabilities or technical knowledge to fully adopt this level of B2B e-commerce. This was confirmed by Zaied (2012), who found that technical barriers were the most important barriers to e-commerce adoption by SMEs in Egypt. Additionally, Hussein (2009) found that lack of the resources (e.g. financial and technical resources) were the most important obstacle to Web adoption by Egyptian SMEs. This implies that, although the SMEs represented the majority of the Egyptian companies, and they provided jobs for almost three-quarters of new applicants to the labour market (Ghanem, 2013), the Egyptian governmental and nongovernmental organisations do not support SMEs. In addition, the SMEs provided a great number of poor and middle-income people with affordable goods and services (UNDP, 2005).

6.4 Levels of B2B e-commerce adoption and competitive advantage

This section covers the third objective of the study determining the effects of different levels of B2B e-commerce adoption on competitive advantage of manufacturing SMEs in Egypt and the US. The most interesting finding was that the level of competitive advantage achieved is higher amongst the American SMEs as a

result of their more mature adoption of B2B e-commerce (supporting hypothesis 21).

At the first level of B2B e-commerce adoption, 'electronic information search and creation', both the USA and Egyptian SMEs achieve the cost reduction aspect of competitive advantage, reducing the costs of communicating with business partners as well as inventory costs. However, adopting this level of B2B e-commerce enables another two forms of cost reduction in the USA companies: the costs of marketing products/services, and customer support costs. In contrast, the Egyptian SMEs achieve coordination cost reductions. This is generally in line with previous studies by Lefebvre et al. (2005) and Elia et al. (2007), who also found that adopting B2B e-commerce achieves these forms of cost reduction. Meanwhile, N`Da et al. (2008) found that the cost reductions obtained from B2B e-commerce adoption were only marginal.

The R^2 value shows the extent to which cost reductions are achieved. The R^2 of 0.48 for the USA SMEs versus 0.08 for the Egyptian SMEs show (see Figures 5-1 and 2) that the USA firms achieve greater competitive advantages than their peers in Egypt (hypothesis 21). The results show that USA SMEs focus on customer services, marketing, and inventory costs, which enables them to achieve these strong competitive advantages. Furthermore, at the next B2B e-commerce adoption level, 'simple electronic transactions', the results show that both USA and Egyptian SMEs achieve the same cost reduction advantages as they do at level 1, as the R^2 values do not change(see Figures 5-3 and 4). This finding is consistent with Lefebvre et al.

(2005), who found that levels 1 and 2 of B2B e-commerce adoption achieve similar benefits.

When SMEs upgrade to the third level of B2B e-commerce adoption, 'complex electronic transactions' (Figures 5-5 and 6), it is found that when SMEs use electronic transactions they achieve a higher level of cost reduction (supporting hypothesis 20). This is clearly shown by the fact that the R^2 value increases for both USA and Egyptian SMEs to 0.52 and 0.12 respectively. However, at this level, the USA firms achieve greater competitive advantages than their Egyptian counterparts, which again supports hypothesis H21. This is very likely simply because the USA SMEs use twelve of the level 3 eBPs while the Egyptian SMEs use just five. The difference could be a result of Egyptian SMEs lacking the resources, capabilities or technical knowledge to fully adopt this level of B2B e-commerce. This was confirmed by Zaied (2012), who found that technical barriers are the most important barriers to e-commerce adoption by SMEs in Egypt. Additionally, Hussein (2009) found that firm resources affect Egyptian SMEs' decisions regarding Internet adoption.

At level four of B2B e-commerce adoption, 'electronic collaboration', there is a small increase in cost reduction among the USA firms (supporting hypothesis 20). This is probably because at this stage firms care more about other advantages, such as growth and quality. However, the Egyptian SMEs do not achieve any further competitive advantages as they do not adopt any eBPs at level 4 (supporting hypothesis 21). The limited contribution to cost reduction from adopting level four (in the USA firms) could be due to the increase in the costs of the IT infrastructure

required at this level. Furthermore, it is possible that cost reductions will only be noticed in the long run, as confirmed by Poon and Swatman (1999), who showed that the advantages created by IT adoption often take some time to appear.

The present study now is turned to the differentiation of products and services, the second competitive advantage investigated here. When SMEs adopt the first level of adoption, they achieve various forms of differentiation; these are providing new products/services to customers, and providing better products/services to customers. In addition to these forms of differentiation, which are achieved by both USA and Egyptian SMEs, the USA SMEs achieve a third form, increasing customers' ability to customize products/services. The Egyptians too achieve a third advantage: enhancing the credibility and prestige of the organisation. It is clear that USA SMEs focus more on customer services than do Egyptian SMEs. Generally, the results show that adopting B2B e-commerce can help SMEs to gain differentiation advantages. These findings are consistent with previous studies (Lederer et al., 1997 , Porter, 2005), which also found that adopting e-commerce achieves these forms of differentiation.

When SMEs upgrade to higher levels, they achieve higher levels of differentiation, which supports the hypothesis H20. An R^2 value of 0.48 when USA SMEs adopt the second level increases to 0.53 and 0.54 when they upgrade to the third and fourth levels respectively. Similarly, for Egyptian SMEs, the R^2 value increases from 0.10 (level 2), to 0.15 and 0.14 at the third and the fourth levels respectively.

Furthermore, the higher the level of B2B e-commerce adoption, the higher is the level of growth achieved, which again supports the hypothesis H20. The USA SMEs achieve increased market share, customer satisfaction, and the penetration of new markets. The Egyptian SMEs achieve enhanced business efficiency, an expanded market share and increased sales. This finding is related to the work of N`Da et al. (2008), who found that adopting B2B e-commerce helps SMEs to increase sales, growth and revenue. Meanwhile, Elia et al. (2007) revealed that SMEs that adopt B2B e-commerce derive benefits such as increased revenues, firm efficiency, market share and customer satisfaction. Additionally, Lal (2002) found that B2B e-commerce helps SMEs to access international markets. Further evidence is again provided by the R^2 values. Figures 5-1, 3, 5 and 7 show that there is an increase in the level of growth among the USA SMEs, with the value increasing from 0.45 at the second level of adoption to 0.49 at the third and 0.50 at the fourth, which supports hypothesis H20. However, the Egyptian SMEs remain at almost the same level of growth, regardless of the level of adoption. In all, SMEs adopt a higher level of B2B e-commerce to expand their market share, sales and revenues, as revealed by Abou-Shouk et al. (2012), who found that adopting an advanced level of e-commerce helps SMEs to create new online distribution channels equivalent to their traditional methods of distribution.

The final dimension of competitive advantage discussed in this study is quality. It is found that adopting B2B e-commerce does achieve some indicators of quality, namely fast delivery (both USA and Egyptian SMEs), an increase in the quality of customer service, and an increase in product/service quality (USA SMEs), and an

increase in information quality, and the quality of relations with business partners (Egyptian SMEs). These findings are consistent with the previous study by N`Da et al. (2008), which found that the most important advantage gained from B2B e-commerce adoption is an increase in the quality of products and services. Furthermore, Lefebvre et al. (2005) found that B2B e-commerce adoption helps SMEs to increase customer service quality and reduce delivery time. Additionally, Barrett and Konsynski (1982) pointed out that IT adoption increases the level of collaboration between business partners.

As for the differences in quality achieved when adopting different levels of B2B e-commerce, the results reveal that the USA enterprises achieve significant quality improvements, with R^2 values of 0.48, 0.48, 0.52, and 0.53 for the four levels of adoption, which supports hypothesis H20. For the Egyptian SMEs, level 1 adoption brings no advantages in terms of quality, while the higher levels all produce the same level of quality.

To sum up, it is clear that adopting a higher level of B2B e-commerce leads to greater competitive advantages (supporting hypothesis 20). However, the Egyptian SMEs appear to be far behind their USA counterparts in implementing B2B e-commerce eBPs and thus achieve lower levels of competitive advantage (hypothesis21).

6.5 Indirect impacts of technological, organisational and environmental factors on competitive advantage

This section covers the fourth objective of the study investigating the indirect impacts of technological, organisational and environmental factors on the competitive advantage through levels of B2B e-commerce adoption. Regarding the American manufacturing SMEs, the results of this study indicate that relative advantage has a powerful and positive impact on all forms of competitive advantage which are mediated by levels of B2B e-commerce adoption. These demonstrated the essential role played by technology in helping the American manufacturing SMEs to achieve competitive advantage. These results are in line with the findings of Lefebvre et al. (2005) and Elia et al. (2007) who found that adopting B2B e-commerce achieved benefits for Canadian SMEs. It also goes in line with the findings of Poon and Swatman (1999) and Mustaffa and Beaumont (2004) who found that adopting e-commerce could help Australian small businesses to gain competitive advantage. Moreover, in their study of the UK SMEs, Pavic et al. (2007) found that e-business helped companies to create competitive advantage.

In addition, the results of study indicate that compatibility has a strong and positive impact on cost reduction, whilst it has a weak effect on differentiation, growth and quality via the levels of B2B e-commerce. This result might be explained by the fact of the compatibility of B2B e-commerce technology with the manifacuring SMEs' existing procedures and their experience and technological equipment which helped them to reduce related costs. This is because, often, the costs of adopting new

technology seemed to be high (AlGhamdi et al., 2011, Ghobakhloo et al., 2011). These costs comprised of staff training and technological equipment (Chen and McQueen, 2008, Lawrence and Tar, 2010, Abou-Shouk, 2012), and building websites and adopting online technologies (MacGreogor and Vrazalic, 2005).

With regard to the organisational factors, it is found that the top management support has a positive effect on cost reduction, differentiation, growth and quality. This indicates the important role, played by managers/owners in helping American manufacturing SMEs to achieve competitive advantage. At the same time, firm size has very weak impact on all forms of competitive advantage. This implies that the size of the manufacturing American SME do not play an important role in achiveing competitive advantage. This result is consistent with the findings of Wan and Bullard (2008) who found that, in the American companies, firm size had no significant impact on competitive advantage.

Furthermore, the results of the study indicate that American manufacturing SMEs' environmental factors, such competitive pressure, business partner pressure and government support have a positive impact on competitive advantage, mediated by the levels of B2B e-commerce adoption. It was found that competitive pressure has a positive and significant impact on competitive advantage. These results go in line with the findings of Wan and Bullard (2008) who found that intensity of competition, between existing competitors, had significant effects on competitive advantage. Similarly, business partner pressure has significant impact on competitive advantage.

In addition, the findings indicate that business partner pressure has high impact on quality. A possible explanation for this might be that these types of pressure drove American manufacturing SMEs to improve their products/service quality. This findings of the current study are consistent with those of Raymond (2001); Simpson and Docherty (2004); Beckinsale and Levy (2004); Buhalis and Deimezi (2004); Beekhuyzen et al., (2005) and Teo et al. (2009) who found that suppliers or clients continued to demand improved product/service quality from their business partners. With regard to government support, it has a positive and significant effect on competitive advantage. The government could influence and support firms by laws, regulation and investment in the infrastructure. Oxley and Yeung (2001) and Zhu and Thatcher (2007) stated that the government had an important part since it created an institutional environment which encouraged private investment.

Regarding Egyptian manufacturing SMEs, the results of this study indicate that relative advantage has a positive impact on competitive advantage, mediated by the levels of B2B e-commerce adoption. At the same time, complexity has a negative effect on competitive advantage. This result could be explained by the fact that Egyptian manufacturing SMEs has difficulties in understanding and applying B2B e-commerce technology and this could lead to resistance, slower recognition of its value, and fear of failure. All these attitudes reflected negatively on competitive advantage. In relation to organisational factors, the results of study indicate that, mediated by levels of B2B e-commerce adoption, top management support has a negative impact on competitive advantage.

This result is expected because this study's findings found that the Egyptian manufacturing SMEs' owners-managers have negative attitudes toward the adoption of B2B e-commerce. Furthermore, the results of the study indicate that, mediated by levels of B2B e-commerce adoption, competitive pressure is the only factor of the Egyptian SMEs' environmental context which affects competitive advantage. It was found that competitive pressure has a positive significant impact on competitive advantage. These results are in line with the findings of Wan and Bullard (2008) who found that intensity of competition, between existing competitors, had significant effects on competitive advantage.

Moreover, it is clear that there are difference between the effects of technological factors, organisational factors and environmental factors on competitive advantage in Egypt and in the USA via the mediation of the different levels of B2B e-commerce adoption (supporting hypotheses 25, 26 and 27).

6.6 Summary

According to the study objectives, this chapter discussed the findings of study. It has linked the study findings to previous studies. It covered the factors affecting the levels of B2B e-commerce adoption (technological factors, organisational factors, and environmental factors); the levels of B2B e-commerce adoption; and their impacts on manufacturing SMEs' competitive advantage. This study discussed, also, the effect of technological factors, organisational factors, and environmental factors on competitive advantage via the levels of B2B e-commerce adoption. The majority of the findings are in line with previous research on the different contexts/

environments of SMEs adopting IT. These previous studies confirmed the reliability of this study's findings.

Chapter 7: Conclusion, implications of the study, recommendations of the study, Limitations and directions for future research

7.1 Introduction

This Chapter presents an overview of the study. It summarizes the results revealed by the research. Besides, it shows the theoretical and practical implications of the research. Furthermore, it provides general recommendations to USA and Egyptian manufacturing SMEs and governmental and nongovernmental organisations for manufacturing SMEs' successful adoption and upgrading of B2B e-commerce. In addition, it describes the study's limitations and provides idea for future research.

7.2 Conclusion

The study identified the factors affecting American manufacturing SMEs (in a developed country) and Egyptian SMEs (in a developing country) adopting each level of B2B e-commerce. Also, this study investigated the adoption levels of B2B e-commerce and how these affected the SMEs' competitive advantage. Using structural equation modelling, the research revealed that three main factors influenced American and Egyptian manufacturing SMEs' adoption of B2B e-commerce. Namely, these were: technological factors; organisational factors; and environmental factors. A questionnaire, which included 36 items, was used to measure the adoption level of B2B e-commerce. 15 technological factors, 8 organisational factors, 13 environmental factors, and 29 items relating to competitive advantage, were used to collect data from American and Egyptian manufacturing SMEs.

The structural model, examining 27 hypotheses, conceptualises the causal relationships between the latent variables, based on TOE framework. It revealed that, as mediated by the levels of B2B e-commerce adoption, competitive advantage was affected by technological factors, organisational factors, and environmental factors.

Within the study, it was found that American and Egyptian SMES' adoption of each level of B2B e-commerce was affected by different factors from another level of adoption. Besides, there was a significant difference between the issues which faced manufacturing SMEs in the USA and in Egypt. Furthermore, when Egyptian manufacturing SMEs made their decisions to adopt B2B e-commerce, they considered the main factors to be relative advantage and competitive pressure. On the other hand, when American manufacturing SMEs made their decisions to adopt B2B e- commerce, they considered the main factors to be relative advantage, top management support, firm size and government support.

Moreover, this study compared the adoption level of B2B e-commerce and competitive advantages gained by American manufacturing SMEs (a developed country) with those obtained by Egyptian manufacturing SMEs (a developing country). The findings revealed that the higher the level of B2B e-commerce, which SME adopted, the higher the level of competitive advantage it gained. However, in developing countries such as Egypt, SMEs remained far behind their peers in developed countries. They struggle to upgrade their level of adoption, as shown in

the Egyptian context with many SMEs adopting levels 1, a few attempting level 2 and 3 and very few at level 4.

The findings revealed, also, that SMEs focused more on growth advantages since this allowed them to continue to compete in the global market. It allowed them to increase their market share and, in turn, affected their sales and revenue growth. Quality concerns and cost reductions are the forms of competitive advantage which were targeted next.

Investigating the level of adoption and how it affected competitive advantage via the TOE provided a way to determine how SMEs could use their resources to build and sustain competitive advantage. Given that very few studies had investigated how internet technologies, in general, had affected competitive advantage, this study fills the gap in the extant literature and shows how adopting B2B, in particular, leads to different competitive advantages. Accepting the fact that B2B e-commerce could be adopted in different stages (denoted in this study as levels 1, 2, 3 and 4) led the researcher to the proposal that each stage would achieve certain competitive advantages or certain levels of advantages.

Furthermore, using both developed and developing country context provided the researcher with an overall understanding of how the resources of SMEs can be used to generate and sustain competitive advantages in two different environments. Developing countries, which tend to share a lack of infrastructure readiness; a lack of skilled labour; employee resistance to move from traditional to automated ways of

doing business; and customer concerns (readiness, trust, and satisfaction), face a consequent delay in adopting technology and, in turn, strong competition from global markets in terms of market share, sales, and revenues. The comparison between these two contexts could give SMEs' managers an overview of how SMEs, in developed countries, use resources to increase their competitive positions. This could provide insights to SMEs' managers that could help them to prepare agendas for B2B e-commerce expansion and identify the required resources, and training.

7.3 Study implications

7.3.1 Theoretical implications

In terms of theoretical implications, the study could be considered as a unique study in the field of B2B e-commerce in general and B2B e-commerce in Egyptian manufacturing SMEs in particular. This is because, by looking back at the literature review, it is clear that empirical studies into B2B e-commerce issues including manufacturing SMEs is still embryonic (i.e.,Lefebvre et al., 2005, Elia, 2009) in the developed countries and rare in the developing countries and especially so in the Arabic countries.

In addition, most previous studies have focused on a broad and generic view of the adoption of B2B e-commerce by SMEs, or on the relationship between IT adoption and competitive advantage. This study is unique in that it is conducted in a cross-country context, looking at B2B e-commerce adoption by manufacturing SMEs from the adoption level perspective. Thus it has made an original empirical contribution

towards the current body of knowledge on the adoption of B2B e-commerce and identified, in particular, the levels of B2B e-commerce adopted by manufacturing SMEs (this relate to the second objective of study). The study identified, also, their impacts on competitive advantage (this relate to the third objective of study), and the significant factors that influence each level of B2B e-commerce adoption in USA as a pioneer developed country leads the world in B2B e-commerce adoption, and in Egypt as a big developing country depends heavily on SMEs in its economy (this relate to the first objective of study).

As mentioned above, this research was designed to identify the actual level of B2B e-commerce adoption amongst manufacturing SMEs in both America and Egypt, and their impacts on competitive advantage. In addition, the research aimed to identify the significant factors which influenced both countries (USA and Egypt) to adopt each level of B2B e-commerce. Therefore, this study provides a better understanding of the adoption levels of B2B e-commerce; the factors which affect each level of adoption; and the competitive advantage which manufacturing SMEs, in both developed and developing countries, gained from each level of adoption. In other words, the findings help to provide a better understanding of B2B e-commerce adoption behaviour in manufacturing SMEs in both developed and developing countries.

Moreover, the findings of this research confirm that there are some similarities as well as dissimilarities between the factors affecting the levels of B2B e-commerce adopted by American and Egyptian manufacturing SMEs. In this regard, the impact of

the relative advantage factor on the Egyptian manufacturing SMEs (a developing country) adoption of B2B e-commerce was similar to its impact on American manufacturing SMEs (developed country). In contrast, the impacts of complexity, compatibility, firm size, and top management support, competitive pressure, business partner pressure and government support on the levels of B2B e-commerce adopted by Egyptian manufacturing SMEs was different when compared to their impact on the levels of B2B e-commerce adopted by American manufacturing SMEs.

Furthermore, the findings of study assist in answering the question of why SMEs, in developing countries, are slow and hesitant in adopting IT even though it could improve their competitive advantage. Although competitive pressure push Egyptian manufacturing SMEs to adopt B2B e-commerce, some owners/managers of manufacturing SMEs do not believe that competitive advantage could be gained from B2B e-commerce adoption, while others believe that competitive advantage could be gained from B2B e-commerce adoption. They have taken some steps towards adopting B2B e-commerce but face obstacles which prevented them from moving to a higher level of B2B e-commerce. In addition, the findings confirmed that there are different levels of B2B e-commerce and different competitive advantages are gained from each level of adoption. In addition, each level of B2B e-commerce adoption is affected by different factors from the other levels.

Also, this study contributes to the theory of B2B e-commerce by examining and investigating the phenomenon in the contexts of both USA and Egyptian manufacturing SMEs. Through this, the study contributes, also, to the expansion of

the studies on B2B e-commerce in manufacturing SMEs. In addition, this research reflects the perceptions of B2B e-commerce in USA manufacturing SMEs in particular, therefore offering the perspective of a developed country. In the future, this could be used to make comparisons in order to analyse the manufacturing SMEs' progress in adopting B2B e-commerce. Similarly, this research reflects, also, the perceptions of B2B e-commerce in Egyptian manufacturing SMEs in particular, hence offering the perspective of a developing country, and can be used in the future to make comparisons so as to analyse the progress of B2B e-commerce adoption by manufacturing SMEs.

This study took TOE as the theoretical framework to investigate factors affecting B2B e-commerce in SMEs and focused largely on the factors affecting each level; this is a new contribution to the extant literature. Based on the TOE framework, this study made another contribution to theory, by examining the indirect relationship between technology context, organisational context and environment context and competitive advantage. This is, also, a new contribution to the extant literature. Moreover, the study findings confirm that TOE framework is valid in illustrating the adoption of B2B e-commerce by USA and Egyptian manufacturing SMEs.

Contributing to methodology, the measurement model, developed in this research, could be useful for researchers conducting further studies into manufacturing SMEs' adoption of B2B e-commerce in the context of developed and developing economies. By using measurement model of study to measure B2B e-commerce

adoption in manufacturing SMEs in the different contexts of both developed and developing economies, researchers might add to and enrich the extant literature.

7.3.2 Practical implications

Turning to the practical implications of the study, important implications for the owner/managers of manufacturing SMEs can be drawn from the findings to help them to understand their environments as they move through the different stages of B2B e-commerce adoption in a cross-country business context. In addition to the implication for owners/managers of manufacturing SMEs, this study presents important implications for governmental and nongovernmental organisations, and other institutions linked to manufacturing SMEs.

It is essential for SMEs` owners/managers to realize the influence which B2B e-commerce can have on their organisations. SMEs, which are hesitant to adopt B2B e-commerce, need to examine their situation carefully since adopting B2B e-commerce is likely to be a necessity for most, if not all, businesses. They should acknowledge, also, that the advantages gained from the adoption of technology often take some time to become noticeable. However, this should not discourage SMEs from adopting B2B e-commerce at an early stage.

Based on the findings of the study, owners/managers of manufacturing SMEs, governmental and nongovernmental organisations and other institutions (not only in the USA and Egypt but, also, in all similar countries) linked to small and medium manufacturers will have a better understanding that the adoption of B2B e-

commerce occurs at different levels and different factors affect each level. These carry implications for policy makers, owner/managers of manufacturing SMEs and consultants who should realize that there are different levels of B2B e-commerce adoption. Hence, they should concentrate on the factors relevant to each level. In addition, these results can be used in planning and directing these SMEs' future strategies, policies and plans.

Moreover, the findings of this study reveal that a higher level of B2B e-commerce adoption creates a greater competitive advantage. Consequently, this should motivate the owners or managers of SMEs to adopt a high level of technology and become more technology-oriented in order to enhance their competitive position in the marketplace.

Additionally, this study shows that the adoption of B2B e-commerce could help SMEs to grow their businesses. The results show that adoption of B2B e- commerce could increase market share and, in turn, this affect sales and revenue. Consequently, as the decision makers regarding adoption, managers should be encouraged to invest in technology.

Meanwhile, technology vendors should target their services at different segments of SMEs based on their current level of adoption. In addition, it would be useful to study manufacturing SMEs in different environments. This would provide interesting information regarding whether the adoption of B2B e-commerce is influenced by the development of a country's economy and would allow IT consultants and vendors to

tailor their services and products based on the level of development in a country. The findings of this study will be helpful for multinational companies aiming to start operations in a new country as the study has looked at two opposing environments. Policy makers could use the results of this research to develop more focused policies in order to motivate SMEs, especially in developing countries, to adopt and/or use a higher level of B2B e-commerce. This is because the findings confirm that, in developing countries such as Egypt, SMEs remained far behind their peers in developed countries. Therefore, governments should introduce national initiatives to encourage the SMEs to adopt technology. This should take two forms. Firstly, they should promote an awareness of B2B e-commerce and its benefits for SMEs. Secondly, they should reduce the barriers to adopting B2B e-commerce by improving public infrastructure services and the technical support available to SMEs.

7.4 Recommendations of the study

An understanding of the competitive advantage that gains via different levels of B2B e-commerce adoption by owners/managers of manufacturing SMEs, on the one hand, and the initiatives taken by governmental, nongovernmental organisations and other institutions linked to small and medium manufactories, on the other, will help manufacturing SMEs to adopt B2B e-commerce in order, regardless of the business environment, to enhance their competitive advantage in global markets.

It is important for owners/managers of USA and Egyptian manufacturing SMEs to realize the influence which B2B e-commerce can have on their firms. In addition, they should acknowledge, also, that the advantages, gained from the adoption of

technology, often take some time to become noticeable. However, this should not discourage SMEs from adopting B2B e-commerce at an early stage. Moreover, it is important for manufacturing SMEs' owners/manager, who wants to adopt B2B e-commerce or to advance to a higher level, to evaluate all features of their technological, organisational, and environmental contexts, since they need to identify the factors which will determine successful transformation.

In addition, for those owners/managers of manufacturing SMEs who desire to adopt B2B e-commerce or advance to a higher level, it is essential that there is a clear implementation plan. This study recommends that manufacturing SMEs adopt B2B e-commerce step by step, starting simply with Stage 1, 'electronic information search and creation'. This is classified as a beginner level before moving gradually through the adoption levels until they reach the last stage, 'electronic collaboration'. This is classified as an advanced adoption level of B2B e-commerce. Adopting the step-by-step plan is particularly suitable for manufacturing SMEs with limited resources.

Stage 1, 'electronic information search and creation', and this stage includes five eBPs: seeking out new suppliers, products/services, and new customers, advertising the company/services, and digitalizing information about products.

Stage 2, 'simple electronic transactions', it encompasses seven eBPs: accessing suppliers' product/service databases, placing/managing orders with suppliers, using electronic catalogues to buy products/services, accessing customers' product/service

databases, receiving/managing customer orders, using electronic catalogues to sell products/services, and offering after-sales services for customers. Stage 1 is also included within stage 2.

Stage 3, 'complex electronic transactions', it comprises twelve eBPs: accessing suppliers' inventories, negotiating contracts (price, volume) with suppliers, buying products/services via electronic auctions, buying products/services by issuing electronic calls for tenders, making electronic payments to suppliers, allowing suppliers to access the company's inventory, allowing customers to access the company's inventory, selling products/services via electronic auctions, selling products/services by responding to electronic calls for tenders, negotiating contracts (price, volume) with customers, accessing customers' inventories, and receiving electronic payments from customers. Stages 1 and 2 are included within stage 3.

The last stage, 'electronic collaboration', includes another twelve eBPs: transferring documents and technical drawings to suppliers, collaborating in online engineering with suppliers, transferring documents and technical drawings to customers, collaborating in online engineering with customers, integrating software supporting product design (e.g. CAD/CAM, VPDM), automating the production floor using a manufacturing execution system (MES), integrating the MES into the management information system, ensuring the management of quality assurance using the management information system, automating distribution/logistics using a logistics execution system (LES), allowing distribution/transportation partners to access the information they need (SKU, quantity turnaround, etc) in order to reduce

distribution time and costs, optimizing returns management, and tracking sold or purchased products during transportation. The first three stages are also included in the fourth stage.

Adopting the step-by-step approach presents a straightforward and simple strategy for implementation and can enable manufacturing SMEs` owners/ managers to assess each level in turn and to evaluate how it will contribute to their competitive advantage.

Another recommendation is that governmental, nongovernmental organisations and other institutions, linked with small and medium manufactories, should work to increase the awareness of B2B e-commerce advantages to manufacturing SMEs and support their start-up costs. Highlighting as role models and publishing their success stories, manufacturing SMEs, which have adopted B2B e-commerce already should motivate non-adopters to adopt B2B e-commerce and, therefore, grow their competitive position. Manufacturing SMEs need tailored advice on the implementation of B2B e-commerce. It may be necessary for the government to provide an advice and consultancy service for manufacturing SMEs which want to adopt B2B e-commerce or to adopt a higher level. In addition, B2B e-commerce should be one of the main element in courses and programmes provided to SMEs' owners/managers of across all business sectors. Universities and relevant organisations should contribute to these initiatives by preparing and running programmes and training courses.

Based on the findings of the study, the owners/managers of Egyptian manufacturing SMEs have negative attitudes towards the implementation of B2B e-commerce. Therefore, governmental and nongovernmental institutions, linked to SMEs, should provide the manufacturing SMEs' owners/managers with appropriate training courses (e.g. IS, IT business like marketing and leadership, and entrepreneurship training) to increase their skills, knowledge and to assist them to understand the importance of adopting B2B e-commerce. The Egyptian government and nongovernmental institutions should develop and issue, also, some policies and decisions to provide manufacturing SMEs with the needed resources, such as technical and financial resources, to adopt B2B e-commerce. Moreover, relevant Egyptian Ministries and organisations should work to reduce the cost related to the adoption of B2B e-commerce. In turn, this will increase the diffusion of B2B e-commerce implementations in SMEs and might lead to a positive effect on the Egyptian economy.

7.5 Limitations and directions for future research

Similar to other studies, this study has a number of limitations. The main one is that it lacks the use of qualitative analysis to depict how SMEs understand the concept of competitive advantages and how this helps them to survive and grow. The researcher tried to overcome this limitation by inserting the open question into the study questionnaire. This is because open questions allow respondents to describe and define an event or situation, as they wish, and to give extensive and developmental answers and new data or issues around the topic of study.

Secondly, each SME's results were gained from a single respondent in both the American and Egypt contexts. This might have produced a certain degree of informant bias. In order to reduce this potential bias, this study contacted the Chief Executive Officers of the SMEs in the American and Egyptian study samples because they have extensive control over their companies' business activities and they have access, also, to all their companies' resources. Thirdly, the study sample comprised only manufacturing American and Egyptian SMEs which have websites.

Another limitation is that the study does not include factors such as culture, technology infrastructure, cost, and type of industry, Internationalisation and the owner/manager's characteristics. These could have explained more why the SMEs do not adopt higher levels of adoption since although this study investigated different technological, organisational and environmental factors, Egyptian SMEs were laggards when compared to their developed counterparts. Therefore, the researcher recommends that future research should address these limitations. Additionally, studying the levels of adoption and competitive advantages in service industries and in large companies, could offer further directions for future research.

Furthermore, Future research could study the levels of B2B e-commerce adoption and performance of organization in manufacturing and service sectors and in both SMEs and large companies. The future research can also investigate the achieved benefits of and barriers to deferent levels of B2B e-commerce adoption; this will help owners or managers of companies to know the barriers and benefits related to their adoption level.

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APPENDICES

Appendix 1: Questionnaire form (English)

Research title: Antecedents of business-to-business e-commerce adoption and its effect on competitive advantage in manufacturing small and medium-sized enterprises:

A comparative study of United States of America and Egypt

Dear Manager,
I am researcher at Plymouth University. I am currently conducting research for my PhD which focuses on B2B e-commerce and competitive advantage in the manufacturing small and medium sized enterprises in USA and Egypt, and the factors that influence B2B e-commerce adoption.

Brief statement of purpose of research: SMEs have a unique and crucial position in every country's economic structure. In an increasingly local competitive and global competitive, many SMEs are seeking to take advantage of the opportunities offered in IT. The use of the Internet and other electronic tools for electronic commerce is one of most widely discussed solutions for increasing abilities of SMEs to compete with large companies. The main aim of this research is to investigate the factors that affecting the levels of B2B e-commerce adoption, and impact of levels of B2B e-commerce adoption on competitive advantage in manufacturing SMEs.

Therefore, I would like you to participate in this research and I would be grateful for any assistance you can provide. You have been identified as someone who could provide a helpful perspective on the use of B2B e-commerce by manufacturing small and medium sized enterprises. Your experiences, views and comments on this topic would be a valuable source of information for my research.

I would like to confirm that this questionnaire is completely for scientific purposes and all collected data will be kept confidential. I will share my results with you and acknowledge your assistance when I publish my research. If you like to receive a copy of a summary from the research please tick:
Yes □. **Please spend less than 15 minute to gain great value for your company.**

Yours sincerely,

Haseba Hamad
Plymouth Business School
Plymouth University
E-Mail: haseba.hamad@plymouth.ac.uk

Section 1: Please, indicate the number of employees in your company by ticking in the appropriate box below:

1- 100 employees ☐ 101-499 employees ☐

Section 2, to what extent do you agree /disagree that your company performs the following business processes electronically? Please tick the number that best represents your opinion.

1=not at all, 2= a little, 3=about average, 4=a lot, 5=totally.

No.	Business processes	Scale				
1.	Seeking out new suppliers	1	2	3	4	5
2.	Seeking out products/ services	1	2	3	4	5
3.	Advertising the company and/ or its products/ services	1	2	3	4	5
4.	Seeking out new customers	1	2	3	4	5
5.	Converting information on products/ services into digital form	1	2	3	4	5
6.	Buying products/ services using electronic catalogues	1	2	3	4	5
7.	Placing and managing orders with suppliers	1	2	3	4	5
8.	Accessing supplier's product/services database	1	2	3	4	5
9.	Selling products/ services using electronic catalogues	1	2	3	4	5
10.	Receiving and managing customer orders	1	2	3	4	5
11.	Accessing customer's product/ service databases	1	2	3	4	5
12.	Offering customers after-sales service	1	2	3	4	5
13.	Buying products/services by electronic auction	1	2	3	4	5
14.	Buying products/services by issuing electronic calls for tenders	1	2	3	4	5
15.	Negotiating contracts (price, volume, etc.) with suppliers	1	2	3	4	5
16.	Making electronic payment to suppliers	1	2	3	4	5
17.	Allowing customers to access the company's inventories	1	2	3	4	5
18.	Accessing customer's inventories	1	2	3	4	5
19.	Allowing suppliers to access the company's inventories	1	2	3	4	5
20.	Accessing supplier's inventories	1	2	3	4	5
21.	Selling products/services by electronic auction	1	2	3	4	5
22.	Selling products/services by responding to electronic calls	1	2	3	4	5

	for tenders					
23.	Negotiating contracts (price, volume, etc.) with customers	**1**	**2**	**3**	**4**	**5**
24.	Receiving electronic payments from customers	**1**	**2**	**3**	**4**	**5**
25.	Transferring documents and technical drawing to customers	**1**	**2**	**3**	**4**	**5**
26.	Transferring documents and technical drawing to suppliers	**1**	**2**	**3**	**4**	**5**
27.	Integrating software supporting product design (e.g. CAD/ CAM, VPDM, PDM)	**1**	**2**	**3**	**4**	**5**
28.	Doing collaborative on-line engineering with suppliers	**1**	**2**	**3**	**4**	**5**
29.	Doing collaborative on-line engineering with customers	**1**	**2**	**3**	**4**	**5**
30.	Automating the production floor using manufacturing execution system (MES)	**1**	**2**	**3**	**4**	**5**
31.	Integrating the MES into the management information system	**1**	**2**	**3**	**4**	**5**
32.	Ensuring the management of quality assurance using the management information system	**1**	**2**	**3**	**4**	**5**
33.	Automating distribution/ logistics using a logistics execution system (LES)	**1**	**2**	**3**	**4**	**5**
34.	Allowing distribution/ transportation partners to access the information they need (SKU, quantity turnaround , etc.) in order to reduce time and costs related to distribution	**1**	**2**	**3**	**4**	**5**
35.	Optimizing returns management (``reverse logistics``)	**1**	**2**	**3**	**4**	**5**
36.	Tracking products (purchased and sold) during transportation	**1**	**2**	**3**	**4**	**5**

Section 3 in **this section, to what extent do you agree/disagree that the following statements can affect your company in using B2B e-commerce? Please tick the number that best represents your opinion.**

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

No.	**statement**	**Scale**				
1.	Using B2B e-commerce would enable my company to accomplish specific task more quickly	**1**	**2**	**3**	**4**	**5**
2.	Using B2B e-commerce would improve my job performance	**1**	**2**	**3**	**4**	**5**
3.	Using B2B e-commerce in my job would increase my productivity	**1**	**2**	**3**	**4**	**5**
4.	using B2B e-commerce would enhance my effectiveness on the job	**1**	**2**	**3**	**4**	**5**
5.	using B2B e-commerce would make it easier to do my job	**1**	**2**	**3**	**4**	**5**
6.	I would find B2B e-commerce useful in my job	**1**	**2**	**3**	**4**	**5**
7.	Using B2B e-commerce is consistent with our company`s culture	**1**	**2**	**3**	**4**	**5**
8.	Attitudes towards B2B e-commerce adoption in our company have been favourable	**1**	**2**	**3**	**4**	**5**

9.	B2B e-commerce adoption is compatible with our information technology infrastructure	**1**	**2**	**3**	**4**	**5**
10.	B2B e-commerce adoption is consistent with our business strategy	**1**	**2**	**3**	**4**	**5**
11.	The skills required to use B2B e-commerce are too complex for our employees	**1**	**2**	**3**	**4**	**5**
12.	Integrating these technologies in our current work practices will be very difficult	**1**	**2**	**3**	**4**	**5**
13.	I believe that B2B e-commerce is cumbersome to use	**1**	**2**	**3**	**4**	**5**
14.	Using B2B e-commerce is often frustrating	**1**	**2**	**3**	**4**	**5**
15.	The owner/manager is interested in the adoption of the B2B e-commerce	**1**	**2**	**3**	**4**	**5**
16.	The owner/manager considers B2B e-commerce adoption is important to the company	**1**	**2**	**3**	**4**	**5**
17.	The owner/manager has effectively communicated its support for B2B e-commerce adoption	**1**	**2**	**3**	**4**	**5**
18.	The owner/manager has allocated adequate resources to adoption of B2B e-commerce	**1**	**2**	**3**	**4**	**5**
19.	The owner/manager actively encourages employees to use the new technologies in their daily tasks	**1**	**2**	**3**	**4**	**5**
20.	The owner/manager is committed to the use of the B2B e-commerce	**1**	**2**	**3**	**4**	**5**
21.	The owner/manager desires to project the company as a leader in the use of new technologies	**1**	**2**	**3**	**4**	**5**
22.	We believe that we will lose our customers to our competitors if we do not adopt B2B e-commerce	**1**	**2**	**3**	**4**	**5**
23.	We feel it is a strategic necessity to use B2B e-commerce to compete in the marketplace	**1**	**2**	**3**	**4**	**5**
24.	Our competitors in market drive our company to use B2B e-commerce	**1**	**2**	**3**	**4**	**5**
25.	Our suppliers demand us to use B2B e-commerce for doing business with them	**1**	**2**	**3**	**4**	**5**
26.	our customers demand us to use B2B e-commerce for doing business with them	**1**	**2**	**3**	**4**	**5**
27.	Our suppliers are using B2B e-commerce	**1**	**2**	**3**	**4**	**5**
28.	Our customers are using B2B e-commerce	**1**	**2**	**3**	**4**	**5**
29.	The government plays an important role in promoting B2B e-commerce in SMEs	**1**	**2**	**3**	**4**	**5**
30.	The government provides incentives to using B2B e-commerce in SMEs	**1**	**2**	**3**	**4**	**5**
31.	Business laws support electronic business	**1**	**2**	**3**	**4**	**5**
32.	The government is helping in giving all kinds of assistance to help small business to use B2B e-commerce					
33.	The government often informs us about the good points of B2B e-commerce	**1**	**2**	**3**	**4**	**5**
34.	Support from government is important to encourage us to use more of the B2B e-commerce in business	**1**	**2**	**3**	**4**	**5**

Section 4 in this section, to what extent do you agree/ disagree the B2B e-commerce adoption can provide the following benefits for your company? Please tick the number that best represents your opinion.

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

No.	Benefits	Scale				
1.	Reducing costs of communication with business partners (e.g.: fax costs, mail costs, phone costs, etc.)	**1**	**2**	**3**	**4**	**5**
2.	Reducing inventory costs	**1**	**2**	**3**	**4**	**5**
3.	Reducing operational costs	**1**	**2**	**3**	**4**	**5**
4.	Reducing costs of marketing, advertisement and sale of products/ services	**1**	**2**	**3**	**4**	**5**
5.	Reducing transaction costs	**1**	**2**	**3**	**4**	**5**
6.	Reducing coordination costs	**1**	**2**	**3**	**4**	**5**
7.	Reducing customer support costs	**1**	**2**	**3**	**4**	**5**
8.	Reducing document processing costs (e.g.: costs of document storage and manipulation, etc.)	**1**	**2**	**3**	**4**	**5**
9.	Reducing document publication costs (e.g.: costs of catalogues and brochures publishing)	**1**	**2**	**3**	**4**	**5**
10.	Providing new products/services to customers	**1**	**2**	**3**	**4**	**5**
11.	Providing better products/services to customers	**1**	**2**	**3**	**4**	**5**
12.	Providing easier customer access to information	**1**	**2**	**3**	**4**	**5**
13.	Speeding up transactions	**1**	**2**	**3**	**4**	**5**
14.	Enhancing the credibility and prestige of the organisation	**1**	**2**	**3**	**4**	**5**
15.	Increasing ability for customers to customize products and services	**1**	**2**	**3**	**4**	**5**
16.	Enhancing brand distinguishability	**1**	**2**	**3**	**4**	**5**
17.	Enhancing business efficiency	**1**	**2**	**3**	**4**	**5**
18.	Better achieve organisation goals	**1**	**2**	**3**	**4**	**5**
19.	Increasing market share	**1**	**2**	**3**	**4**	**5**
20.	Increasing sales	**1**	**2**	**3**	**4**	**5**
21.	Increasing revenue	**1**	**2**	**3**	**4**	**5**
22.	Increasing customer satisfaction	**1**	**2**	**3**	**4**	**5**
23.	Entering new markets	**1**	**2**	**3**	**4**	**5**

24.	Increasing quality of customer service (e.g. quick responses to customer inquiries, promptly follow- up customer claims and complaints, etc.)	**1**	**2**	**3**	**4**	**5**
25	Fast delivery	**1**	**2**	**3**	**4**	**5**
26.	Increasing products /services quality	**1**	**2**	**3**	**4**	**5**
27.	Increasing information quality	**1**	**2**	**3**	**4**	**5**
28.	Reducing transactions errors	**1**	**2**	**3**	**4**	**5**
29.	Increasing quality of relation with business partners	**1**	**2**	**3**	**4**	**5**

- Any comments:

Thank you.

Appendix 2: Questionnaire form (Arabic)

العوامل المؤثرة على تبني التجارة الإلكترونية (B2B) من قبل المشروعات صغيرة ومتوسطة الحجم وتاثريها علي الميزة التنافسية: دراسة مقارنة بين الولايات المتحدة الأمريكية و الجمهورية مصر العربية

Antecedents of business-to-business e-commerce adoption and its effect on competitive advantage in manufacturing small and medium-sized enterprises:

A comparative study of United States of America and Egypt

عزيزي المدير

تقوم الباحثة أ/حسيبة سليم حمد، الباحثة بجامعة Plymouth- مملكة المتحدة، بدراسة التجارة الاليكترونية (B2B) وتأثيرها علي الميزة التنافسية في المصانع الأمريكية و المصرية (صغيرة ومتوسطة الحجم) بالاضافة للعوامل المؤثرة علي تطبيق التجارة الاليكترونية (B2B).

الهدف من الدراسة:

ان المصانع (صغيرة ومتوسطة الحجم) لها مكانة مهمة في الهيكل الاقتصادي لاي دولة. وفي ظل تزايد المنافسة المحلية والعالمية فان الكثير من المصانع (صغيرة ومتوسطة الحجم) تسعى للاستفادة من الفرص التي تقدمها التكنولوجيا. كما ان استخدام الانترنت والوسائل الالكترونية الاخرى في التجارة الاليكترونية (B2B) احد اهم الحلول لزيادة القدرات للمصانع (صغيرة ومتوسطة الحجم) علي المنافسة مع المصانع الكبيرة. وعلي ذلك يهدف هذا البحث الي دراسة العوامل التي تؤثر علي مستويات تطبيق التجارة الاليكترونية (B2B) وتأثيرها علي الميزات التنافسية في المصانع (صغيرة ومتوسطة الحجم).

مشاركتكم في هذا البحث محل تقدير الباحثة وارائكم تقدم معلومات قيمة للدراسة. أود التأكيد علي ان هذا الاستبيان يستخدم لاغراض البحث العلمي وان البيانات المستخدمة ستكون سرية. كما يمكنكم الحصول علي نسخة من ملخص ونتائج الدراسة عند الطلب. برجاء الاجابة علي الاستبيان فقط اذا كان لديكم موقع لمصنعكم الموقر علي الانترنت.

يستغرق هذا الاستبيان 15 دقيقة.

شكرا علي حسن تعاونكم.

الباحثة

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الجزء الاول: الرجاء الاشارة الى عدد العاملون في مصنعكم الموقر: 1- 1- 49 عاملين 2- 50- 100 عاملين

الجزء الثاني: يهدف هذا الجزء الي التعرف الي اي مدي تنجز الانشطة التالية اليكترونيا في مصنعكم الموقر.

برجاء تخير احد هذه الاختيارات: لا على الاطلاق، قليل، متوسط، كثير، بشكل كامل

انشطة الشركة او العمليات؟	لا على الاطلاق	قليل	متوسط	كثير	بشكل كامل
البحث عن الموردين					
البحث عن المنتجات او الخدمات					
الاعلان عن الشركة و منتجاتها وخدماتها					
البحث عن العملاء					
تحويل المعلومات عن المنتجات او الخدمات الي شكل اليكتروني					
شراء المنتجات/الخدمات باستخدام الكتالوجات الاليكترونية					
وضع وادارة اوامر الشراء مع الموردين					
الدخول الى فاعدة بياتات منتجات/خدمات الموردين					
بيع المنتجات/الخدمات باستخدام الكتالوجات الاليكترونية					
استلام وادراة اوامر الشراء الواردة من العملاء					
الدخول الى قاعدة بيانات المنتجات/ الخدمات للشركات التي تتعامل مع مصنعكم					
تقديم خدمات ما بعد البيع للعملاء					
شراء المنتجات/الخدمات عن طريق المزاد الاليكتروني					
اصدار دعوات اليكترونية لتقديم العطاءات					
مفاوضة العقود (السعر,الكمية الخ) مع الموردين					
الدفع الاليكتروني للموردين					
السماح للشركات التي تتعامل مع مصنعكم للوصول لمخزون المصنع					
الدخول لمخزون الشركات التي تتعامل مع مصنعكم					
السماح للموردين للوصول لمخزون المصنع					
الوصول لمخزون الموردين					
بيع المنتجات/ الخدمات عن طريق المزاد الاليكتروني					
بيع المنتجات / الخدمات عن طريق المناقصات الاليكترونية					
مفاوضة العقود (السعر,الكمية,الخ) مع الشركات التي تتعامل مع المصنع					
امكانية الدفع الاليكتروني من قبل العملاء					
ارسال الملفات والرسوم الاليكترونية للعملاء					
ارسال الملفات والرسوم الاليكترونية للموردين					
تكامل البرامج المدعمة لتصميم المنتج (الاوتكاد....)					
القيام بالتعاون الهندسي مع الموردين عبر الانترنت					
القيام بالتعاون الهندسي مع الشركات التي تتعامل مع المصنع عبر الانترنت					
اتمتة كل عمليات الانتاج باستخدام انظمة ادارة العمليات (Manufacturing execution system (MES)					
تكامل انظمة ادارة العمليات مع نظام المعلومات الادارية					
توكيد ادارة ضمان الجودة باستخدام نظام المعلومات الادارية					
اتمتة التوزيع باستخدام انظمة الأدارة اللوجيستية					
السماح لشركاء التوزيع- النقل بالوصول للمعلومات التي يحتاجونها وذلك لتقليل الوقت والتكلفة المتعلقة بالتوزيع					
ادارة المردودات					
خدمة تتبع المنتجات المشتراه او المباعة اثناء نقلها					

الجزء الثالث: يهدف هذا الجزء الي التعرف الي مدى الاتفاق او الاختلاف مع العبارات التالية والتي قد تؤثر علي المصنع لاستخدام التجارة الاليكترونية (B2B): برجاء تخير احد هذه الاختيارات: لا اوافق بشدة، لا اوافق، محايد، موافق، موافق بشدة.

العوامل التي تؤثر علي استخدام التجارة الاليكترونية B2B	لا اوافق بشدة	لا اوافق	محايد	موافق	موافق بشدة
استخدام التجارة الاليكترونية يمكن الشركة من انجاز مهام محددة بسرعة					
استخدام التجارة الاليكترونية يحسن اداء عملي					
استخدام التجارة الاليكترونية لاداء عملي قد يزيد من معدل انتاجيتي					
استخدام التجارة الاليكترونية يحسن من فعاليتي في العمل					
استخدام التجارة الاليكترونية يجعل اداء عملي اسهل					
انا اجد التجارة الاليكترونية مفيدة لعملي					
استخدام التجارة الاليكترونية متوافق مع ثقافة الشركة					
هناك اتجاه واراء ايجابية لطبيق التجارة الاليكترونية في مصنعنا					
تطبيق التجارة الاليكترونية متوافق مع البنية التكنولوجية للمصنع					
تطبيق التجارة الاليكترونية متوافق مع استراتيجية المصنع					
يتطلب استخدام التجارة الاليكترونية مهارات معقدة من العاملين					
هناك صعوبة لتكامل تقنيات التجارة الاليكنرونية مع ممارسات العمل					
اعتقد ان هناك صعوبة في استخدام التجارة الاليكترونية					
قد يكون استخدام التجارة الاليكترونية غير مشجع					
المالك/المدير مهتم بتطبيق التجارة الاليكترونية					
يعتبر المالك/المدير تطبيق التجارة الاليكترونية له أهمية للمصنع					
يساند المالك/المدير تطبيق التجارة الاليكترونية في المصنع بشكل فعال					
يخصص المالك/المدير الموارد اللازمة لتطبيق التجارة الاليكترونية					
يشجع المالك/المدير العاملين لاستخدام التكنولوجيا الحديثة في الانشطة اليومية					
المالك/المدير ملتزم باستخدام التجارة الاليكترونية في المصنع					
يرغب المالك/المدير ان تكون المصنع قائدة في استخدام التكنولوجيا الحديثة					
نعتقد ان عدم تطبيق التجارة الاليكترونية يفقد المصنع لعملائه لصالح منافسيها					
نعتقد ان هناك ضرورة استراتيجة لتطبيق التجارة الاليكترونبة للقدرة علي المنافسة في السوق					
الضغوط من المنافسة وراء استخدام المصنع للتجارة الاليكترونية					
الضغوط من المورد ين وراء استخدام المصنع للتجارة الاليكترونية					
الضغوط من الشركات التي تتعامل مع المصنع(العملاء)وراء استخدام المصنع للتجارة الاليكترونية					
موردونا يستخدمون التجارة الاليكترونية					
الشركات التي تتعامل مع المصنع (عملاؤنا) يستخدمون التجارة الاليكترونية					
تلعب الحكومة دورا مهما في تعزيز استخدام التجارة الاليكترونية في المصانع صغيرة ومتوسطة الحجم					
تحفز الحكومة المصانع صغيرة ومتوسطة الحجم لاستخدام التجارة الاليكترونية					
قوانين العمل تدعم الانشطة الاليكترونية في العمل					
الحكومة تساعد في إعطاء جميع أنواع المساعدة لمساعدة الشركات الصغيرة لاستخدام التجارة الإلكترونية (B2B)					
تقوم الحكومة بالتعريف بالنواحي الايجابية للتجارة الاليكترونية					
يعتبر دعم الحكومة عامل مهم لتشجيع التوسع في استخدام التجارة الاليكترونية					

الجزء الرابع: يهدف هذا الجزء الي التعرف الي اي مدى تتفق اوتختلف مع العبارات التالية والتي توضح الفوائد التي تعود علي المصنع من استخدام التجارة الاليكترونية(B2B).

برجاء تخير احد هذه الاختيارات: لا اوافق بشدة، لا اوافق، محايد، موافق، موافق بشدة.

فوائد التجارة الاليكترونية B2B	لا اوافق بشدة	لا اوافق	محايد	موافق	موافق بشدة
تقليل تكلفة الاتصال بالشركاء					
تقليل تكلفة التخزين					
تقليل تكاليف التشغيل					
تقليل تكلفة التسويق والاعلان عن المنتجات /الخدمات					
تقليل تكلفة التعاملات/ الصفقات التجارية					
تقليل تكلفة التنسيقات/ التسويات					
تقليل تكلفة خدمة العملاء					
تقليل تكلفة الاعمال الورقية					
تقليل تكلفة توزيع الكتالوجات والكتيبات					
تقديم منتجات/ خدمات جديدة للعملاء					
تقديم منتجات/ خدمات جيدة للعملاء					
سهولة البحث والوصول للمعلومات المتاحة للعملاء					
سرعة تنفيذ التعاملات/ الصفقات التجارية					
تحسين مصداقة واحترام الشركة					
امكانية تخصيص المنتجات/ الخدمات من قبل العملاء					
تحسين العلامة التجارية للمصنع					
تحسين كفاءة العمل					
تحقيق اهداف المصنع بشكل افضل					
زيادة الحصة السوقية					
زيادة المبيعات					
زيادة الدخل					
زيادة رضاء العملاء					
دخول اسواق جديدة					
زيادة جودة خدمة العملاء (الاستجابة للاستفسارات ومتابعة الشكاوي)					
التسليم السريع للمنتجات/ الخدمات					
زيادة جودة المنتجات/ الخدمات					
زيادة جودة المعلومات					
تقليل اخطاء التعاملات					
زيادة جودة العلاقات مع الشركاء					

تعليقات اخري

شكرا جزيلا----------

Appendix 3: Non-response rate t-test (US context)

Independent samples test (Levels of B2B e-commerce adoption)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nu Employees	Equal variances assumed	1.464	.229	.616	98	.539	.06000	.09735	.13319	.25319
	Equal variances not assumed			.616	97.890	.539	.06000	.09735	.13320	.25320
LevelA1	Equal variances assumed	.066	.798	.916	98	.362	.22000	.24022	.25671	.69671
	Equal variances not assumed			.916	97.716	.362	.22000	.24022	.25673	.69673
levelA2	Equal variances assumed	.001	.980	1.454	98	.149	.32000	.22002	.11662	.75662
	Equal variances not assumed			1.454	97.158	.149	.32000	.22002	.11667	.75667
levelA3	Equal variances assumed	.066	.798	.916	98	.362	.22000	.24022	.25671	.69671
	Equal variances not assumed			.916	97.716	.362	.22000	.24022	.25673	.69673
levelA4	Equal variances assumed	.654	.421	1.854	98	.067	.44000	.23726	.03084	.91084
	Equal variances not assumed			1.854	97.810	.067	.44000	.23726	.03085	.91085
levelA5	Equal variances assumed	.066	.798	.916	98	.362	.22000	.24022	.25671	.69671
	Equal variances not assumed			.916	97.716	.362	.22000	.24022	.25673	.69673
levelB1	Equal variances assumed	.055	.815	.799	98	.426	.20000	.25035	.29682	.69682
	Equal variances not assumed			.799	97.920	.426	.20000	.25035	.29683	.69683
levelB2	Equal variances assumed	.202	.654	1.205	98	.231	.30000	.24897	.19406	.79406
	Equal variances not assumed			1.205	96.627	.231	.30000	.24897	.19415	.79415
levelB3	Equal variances assumed	.055	.815	.799	98	.426	.20000	.25035	.29682	.69682
	Equal variances not assumed			.799	97.920	.426	.20000	.25035	.29683	.69683
levelB4	Equal variances assumed	.202	.654	1.205	98	.231	.30000	.24897	.19406	.79406
	Equal variances not assumed			1.205	96.627	.231	.30000	.24897	.19415	.79415
levelB5	Equal variances assumed	1.562	.214	.815	98	.417	.20000	.24532	.28682	.68682
	Equal variances not assumed			.815	95.711	.417	.20000	.24532	.28697	.68697
levelB6	Equal variances assumed	.055	.815	.799	98	.426	.20000	.25035	.29682	.69682
	Equal variances not assumed			.799	97.920	.426	.20000	.25035	.29683	.69683
levelB7	Equal variances assumed	.093	.761	.973	98	.333	.26000	.26731	.27046	.79046
	Equal variances not assumed			.973	98.000	.333	.26000	.26731	.27046	.79046
levelC1	Equal variances assumed	.055	.815	.799	98	.426	.20000	.25035	.29682	.69682
	Equal variances not assumed			.799	97.920	.426	.20000	.25035	.29683	.69683
levelC2	Equal variances assumed	.093	.761	.973	98	.333	.26000	.26731	.27046	.79046

	Equal variances not assumed			.973	98.000	.333	.26000	.26731	.27046	.79046
levelC3	Equal variances assumed	1.431	.234	1.456	98	.149	.38000	.26100	.13795	.89795
	Equal variances not assumed			1.456	97.467	.149	.38000	.26100	.13799	.89799
levelC4	Equal variances assumed	1.320	.253	1.696	98	.093	.42000	.24758	.07132	.91132
	Equal variances not assumed			1.696	97.979	.093	.42000	.24758	.07132	.91132
levelC5	Equal variances assumed	1.431	.234	1.456	98	.149	.38000	.26100	.13795	.89795
	Equal variances not assumed			1.456	97.467	.149	.38000	.26100	.13799	.89799
levelC6	Equal variances assumed	1.320	.253	1.696	98	.093	.42000	.24758	.07132	.91132
	Equal variances not assumed			1.696	97.979	.093	.42000	.24758	.07132	.91132
levelC7	Equal variances assumed	1.431	.234	1.456	98	.149	.38000	.26100	.13795	.89795
	Equal variances not assumed			1.456	97.467	.149	.38000	.26100	.13799	.89799
levelC8	Equal variances assumed	.012	.914	1.703	98	.092	.42000	.24659	.06936	.90936
	Equal variances not assumed			1.703	98.000	.092	.42000	.24659	.06936	.90936
levelC9	Equal variances assumed	1.431	.234	1.456	98	.149	.38000	.26100	.13795	.89795
	Equal variances not assumed			1.456	97.467	.149	.38000	.26100	.13799	.89799
levelC10	Equal variances assumed	1.320	.253	1.696	98	.093	.42000	.24758	.07132	.91132
	Equal variances not assumed			1.696	97.979	.093	.42000	.24758	.07132	.91132
levelC11	Equal variances assumed	3.980	.049	.528	98	.599	.14000	.26528	.38645	.66645
	Equal variances not assumed			.528	94.622	.599	.14000	.26528	.38668	.66668
levelC12	Equal variances assumed	1.691	.196	.883	98	.379	.22000	.24916	.27445	.71445
	Equal variances not assumed			.883	97.160	.379	.22000	.24916	.27451	.71451
levelD1	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD2	Equal variances assumed	1.691	.196	.883	98	.379	.22000	.24916	.27445	.71445
	Equal variances not assumed			.883	97.160	.379	.22000	.24916	.27451	.71451
levelD3	Equal variances assumed	1.320	.253	1.696	98	.093	.42000	.24758	.07132	.91132
	Equal variances not assumed			1.696	97.979	.093	.42000	.24758	.07132	.91132
levelD4	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD5	Equal variances assumed	1.691	.196	.883	98	.379	.22000	.24916	.27445	.71445
	Equal variances not assumed			.883	97.160	.379	.22000	.24916	.27451	.71451
levelD6	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD7	Equal variances assumed	3.980	.049	.528	98	.599	.14000	.26528	.38645	.66645
	Equal variances not assumed			.528	94.622	.599	.14000	.26528	.38668	.66668
levelD8	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD9	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
levelD10	Equal variances assumed	.011	.916	1.279	98	.204	.32000	.25026	.17663	.81663

	Equal variances not assumed			1.279	97.552	.204	.32000	.25026	.17666	.81666
levelD11	Equal variances assumed	3.980	.049	.528	98	.599	.14000	.26528	.38645	.66645
	Equal variances not assumed			.528	94.622	.599	.14000	.26528	.38668	.66668
levelD12	Equal variances assumed	.011	.916	1.279	98	.204	.32000	.25026	.17663	.81663
	Equal variances not assumed			1.279	97.552	.204	.32000	.25026	.17666	.81666

Independent samples test (Factors)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
relative1	Equal variances assumed	3.980	.049	.528	98	.599	.14000	.26528	.38645	.66645
	Equal variances not assumed			.528	94.622	.599	.14000	.26528	.38668	.66668
relative2	Equal variances assumed	1.691	.196	.883	98	.379	.22000	.24916	.27445	.71445
	Equal variances not assumed			.883	97.160	.379	.22000	.24916	.27451	.71451
relative3	Equal variances assumed	.011	.916	1.279	98	.204	.32000	.25026	.17663	.81663
	Equal variances not assumed			1.279	97.552	.204	.32000	.25026	.17666	.81666
relative4	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
relative5	Equal variances assumed	.909	.343	1.644	98	.103	.34000	.20684	.07047	.75047
	Equal variances not assumed			1.644	91.112	.104	.34000	.20684	.07086	.75086
relative6	Equal variances assumed	1.203	.275	1.806	98	.074	.38000	.21044	.03761	.79761
	Equal variances not assumed			1.806	91.271	.074	.38000	.21044	.03800	.79800
compati.1	Equal variances assumed	.909	.343	1.644	98	.103	.34000	.20684	.07047	.75047
	Equal variances not assumed			1.644	91.112	.104	.34000	.20684	.07086	.75086
compati.2	Equal variances assumed	1.203	.275	1.806	98	.074	.38000	.21044	.03761	.79761
	Equal variances not assumed			1.806	91.271	.074	.38000	.21044	.03800	.79800
compati.3	Equal variances assumed	1.691	.196	.883	98	.379	.22000	.24916	.27445	.71445
	Equal variances not assumed			.883	97.160	.379	.22000	.24916	.27451	.71451
compati.4	Equal variances assumed	.909	.343	1.644	98	.103	.34000	.20684	.07047	.75047
	Equal variances not assumed			1.644	91.112	.104	.34000	.20684	.07086	.75086
compati.5	Equal variances assumed	.646	.423	1.789	98	.089	.38000	.21237	.04145	.80145
	Equal variances not assumed			1.789	93.773	.089	.38000	.21237	.04168	.80168
complex.1	Equal variances assumed	3.468	.066	.301	98	.764	.06000	.19920	.33531	.45531

	Equal variances not assumed			.301	93.937	.764	.06000	.19920	.33552	.45552
complex.2	Equal variances assumed	.359	.550	1.070	98	.287	.22000	.20558	.18796	.62796
	Equal variances not assumed			1.070	94.372	.287	.22000	.20558	.18815	.62815
complex.3	Equal variances assumed	3.468	.066	.301	98	.764	.06000	.19920	.33531	.45531
	Equal variances not assumed			.301	93.937	.764	.06000	.19920	.33552	.45552
complex.4	Equal variances assumed	2.923	.090	.607	98	.545	.12000	.19754	.27200	.51200
	Equal variances not assumed			.607	92.080	.545	.12000	.19754	.27232	.51232
topM.1	Equal variances assumed	2.081	.152	.539	98	.591	.10000	.18545	.26802	.46802
	Equal variances not assumed			.539	91.904	.591	.10000	.18545	.26833	.46833
topM.2	Equal variances assumed	3.468	.066	.301	98	.764	.06000	.19920	.33531	.45531
	Equal variances not assumed			.301	93.937	.764	.06000	.19920	.33552	.45552
topM.3	Equal variances assumed	.014	.906	1.886	98	.062	.40000	.21212	.02095	.82095
	Equal variances not assumed			1.886	95.564	.062	.40000	.21212	.02108	.82108
topM.4	Equal variances assumed	.153	.697	1.836	98	.069	.38000	.20700	.03078	.79078
	Equal variances not assumed			1.836	97.431	.069	.38000	.20700	.03081	.79081
topM.5	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710
topM.6	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
topM.7	Equal variances assumed	1.225	.271	1.295	98	.198	.28000	.21628	.14919	.70919
	Equal variances not assumed			1.295	92.715	.199	.28000	.21628	.14950	.70950
competitiv	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
e p. 1	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710
competitiv	Equal variances assumed	1.225	.271	1.295	98	.198	.28000	.21628	.14919	.70919
e p.2	Equal variances not assumed			1.295	92.715	.199	.28000	.21628	.14950	.70950
competitiv	Equal variances assumed	.153	.697	1.836	98	.069	.38000	.20700	.03078	.79078
e p. 3	Equal variances not assumed			1.836	97.431	.069	.38000	.20700	.03081	.79081
business	Equal variances assumed	1.026	.314	1.673	98	.097	.42000	.25099	.07808	.91808
p.p. 1	Equal variances not assumed			1.673	97.690	.097	.42000	.25099	.07810	.91810
business	Equal variances assumed	.359	.550	1.070	98	.287	.22000	.20558	.18796	.62796
p.p. 2	Equal variances not assumed			1.070	94.372	.287	.22000	.20558	.18815	.62815
business	Equal variances assumed	.520	.473	1.489	98	.140	.30000	.20148	.09984	.69984
p.p. 3	Equal variances not assumed			1.489	92.984	.140	.30000	.20148	.10011	.70011
business	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
p.p. 4	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710
governme	Equal variances assumed	.520	.473	1.489	98	.140	.30000	.20148	.09984	.69984
nt.1	Equal variances not assumed			1.489	92.984	.140	.30000	.20148	.10011	.70011
governme	Equal variances assumed	.359	.550	1.070	98	.287	.22000	.20558	.18796	.62796
nt.2	Equal variances not assumed			1.070	94.372	.287	.22000	.20558	.18815	.62815
governme	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180

nt.3	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
governme	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
nt.4	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
governme	Equal variances assumed	.610	.437	1.772	98	.080	.36000	.20316	.04316	.76316
nt.5	Equal variances not assumed			1.772	92.304	.080	.36000	.20316	.04347	.76347
governme	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
nt.6	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710

Independent samples test (Competitive advantage)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
costredu.1	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
costredu.2	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710
costredu.3	Equal variances assumed	.359	.550	1.070	98	.287	.22000	.20558	.18796	.62796
	Equal variances not assumed			1.070	94.372	.287	.22000	.20558	.18815	.62815
costredu.4	Equal variances assumed	.520	.473	1.489	98	.140	.30000	.20148	.09984	.69984
	Equal variances not assumed			1.489	92.984	.140	.30000	.20148	.10011	.70011
costredu.5	Equal variances assumed	1.776	.186	1.320	98	.190	.26000	.19698	.13089	.65089
	Equal variances not assumed			1.320	97.719	.190	.26000	.19698	.13091	.65091
costredu.6	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
costredu.7	Equal variances assumed	.746	.390	1.743	98	.084	.34000	.19506	.04709	.72709
	Equal variances not assumed			1.743	97.913	.084	.34000	.19506	.04710	.72710
costredu.8	Equal variances assumed	.291	.591	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed			1.883	97.489	.083	.36000	.19115	.01936	.73936
costredu.9	Equal variances assumed	1.776	.186	1.320	98	.190	.26000	.19698	.13089	.65089
	Equal variances not assumed			1.320	97.719	.190	.26000	.19698	.13091	.65091
differe.1	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
differe.2	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230

differe.3	Equal variances assumed	.417	.520	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed			1.476	97.815	.143	.28000	.18974	.09654	.65654
differe.4	Equal variances assumed	1.709	.194	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
differe.5	Equal variances assumed	1.776	.186	1.320	98	.190	.26000	.19698	.13089	.65089
	Equal variances not assumed			1.320	97.719	.190	.26000	.19698	.13091	.65091
differe.6	Equal variances assumed	4.257	.042	2.101	98	.088	.38000	.18090	.02100	.73900
	Equal variances not assumed			2.101	95.557	.088	.38000	.18090	.02089	.73911
differe.7	Equal variances assumed	1.776	.186	1.320	98	.190	.26000	.19698	.13089	.65089
	Equal variances not assumed			1.320	97.719	.190	.26000	.19698	.13091	.65091
growth1	Equal variances assumed	.417	.520	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed			1.476	97.815	.143	.28000	.18974	.09654	.65654
growth2	Equal variances assumed	.291	.591	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed			1.883	97.489	.083	.36000	.19115	.01936	.73936
growth3	Equal variances assumed	4.257	.042	2.101	98	.088	.38000	.18090	.02100	.73900
	Equal variances not assumed			2.101	95.557	.088	.38000	.18090	.02089	.73911
growth4	Equal variances assumed	.417	.520	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed			1.476	97.815	.143	.28000	.18974	.09654	.65654
growth5	Equal variances assumed	3.772	.055	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
growth6	Equal variances assumed	.417	.520	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed			1.476	97.815	.143	.28000	.18974	.09654	.65654
growth7	Equal variances assumed	.745	.390	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed			1.883	97.489	.083	.36000	.19115	.01936	.73936
quality1	Equal variances assumed	1.500	.224	.539	98	.591	.10000	.18545	.26802	.46802
	Equal variances not assumed			.539	91.904	.591	.10000	.18545	.26833	.46833
quality2	Equal variances assumed	.745	.390	1.883	98	.083	.36000	.19115	.01933	.73933
	Equal variances not assumed			1.883	97.489	.083	.36000	.19115	.01936	.73936
quality3	Equal variances assumed	4.257	.042	2.101	98	.088	.38000	.18090	.02100	.73900
	Equal variances not assumed			2.101	95.557	.088	.38000	.18090	.02089	.73911
quality4	Equal variances assumed	3.772	.055	1.580	98	.117	.32000	.20247	.08180	.72180
	Equal variances not assumed			1.580	89.173	.118	.32000	.20247	.08230	.72230
quality5	Equal variances assumed	1.500	.224	.539	98	.591	.10000	.18545	.26802	.46802
	Equal variances not assumed			.539	91.904	.591	.10000	.18545	.26833	.46833
quality6	Equal variances assumed	.417	.520	1.476	98	.143	.28000	.18974	.09653	.65653
	Equal variances not assumed			1.476	97.815	.143	.28000	.18974	.09654	.65654

Appendix 4: Non-response rate t-test (Egyptian context)

Independent samples test (Levels of B2B e-commerce adoption)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nu Employees	Equal variances assumed	1.955	.165	1.649	98	.102	.260	.158	.573	.053
	Equal variances not assumed			1.649	72.059	.103	.260	.158	.574	.054
LevelA1	Equal variances assumed	4.859	.030	.679	98	.499	.100	.147	.392	.192
	Equal variances not assumed			.679	88.014	.499	.100	.147	.393	.193
levelA2	Equal variances assumed	10.215	.002	1.693	98	.094	.180	.106	.391	.031
	Equal variances not assumed			1.693	52.589	.096	.180	.106	.393	.033
levelA3	Equal variances assumed	1.955	.165	1.649	98	.102	.260	.158	.573	.053
	Equal variances not assumed			1.649	72.059	.103	.260	.158	.574	.054
levelA4	Equal variances assumed	9.317	.003	1.651	98	.102	.160	.097	.352	.032
	Equal variances not assumed			1.651	53.353	.105	.160	.097	.354	.034
levelA5	Equal variances assumed	4.261	.042	1.661	98	.100	.280	.169	.614	.054
	Equal variances not assumed			1.661	69.436	.101	.280	.169	.616	.056
levelB1	Equal variances assumed	7.454	.008	.516	98	.607	.080	.155	.388	.228
	Equal variances not assumed			.516	84.419	.607	.080	.155	.388	.228
levelB2	Equal variances assumed	.380	.539	1.658	98	.100	.240	.145	.527	.047
	Equal variances not assumed			1.658	72.644	.102	.240	.145	.528	.048
levelB3	Equal variances assumed	.464	.497	1.745	98	.084	.260	.149	.556	.036
	Equal variances not assumed			1.745	71.162	.085	.260	.149	.557	.037
levelB4	Equal variances assumed	2.272	.135	1.706	98	.091	.260	.152	.562	.042
	Equal variances not assumed			1.706	73.848	.092	.260	.152	.564	.044
levelB5	Equal variances assumed	3.562	.062	.725	98	.470	.100	.138	.374	.174
	Equal variances not assumed			.725	81.884	.471	.100	.138	.375	.175
levelB6	Equal variances assumed	7.454	.008	.516	98	.607	.080	.155	.388	.228
	Equal variances not assumed			.516	84.419	.607	.080	.155	.388	.228
levelB7	Equal variances assumed	7.192	.009	1.559	98	.122	.280	.180	.637	.077
	Equal variances not assumed			1.559	82.771	.123	.280	.180	.637	.077
levelC1	Equal variances assumed	.406	.525	1.692	98	.094	.240	.142	.522	.042
	Equal variances not assumed			1.692	73.700	.095	.240	.142	.523	.043
levelC2	Equal variances assumed	3.562	.062	.725	98	.470	.100	.138	.374	.174

	Equal variances not assumed			.725	81.884	.471	.100	.138	.375	.175
levelC3	Equal variances assumed	7.454	.008	.516	98	.607	.080	.155	.388	.228
	Equal variances not assumed			.516	84.419	.607	.080	.155	.388	.228
levelC4	Equal variances assumed	.380	.539	1.658	98	.100	.240	.145	.527	.047
	Equal variances not assumed			1.658	72.644	.102	.240	.145	.528	.048
levelC5	Equal variances assumed	4.347	.040	1.177	98	.242	.240	.204	.165	.645
	Equal variances not assumed			1.177	93.607	.242	.240	.204	.165	.645
levelC6	Equal variances assumed	7.454	.008	.516	98	.607	.080	.155	.388	.228
	Equal variances not assumed			.516	84.419	.607	.080	.155	.388	.228
levelC7	Equal variances assumed	7.192	.009	1.559	98	.122	.280	.180	.637	.077
	Equal variances not assumed			1.559	82.771	.123	.280	.180	.637	.077
levelC8	Equal variances assumed	2.145	.146	1.235	98	.220	.220	.178	.134	.574
	Equal variances not assumed			1.235	93.642	.220	.220	.178	.134	.574
levelC9	Equal variances assumed	4.347	.040	1.177	98	.242	.240	.204	.165	.645
	Equal variances not assumed			1.177	93.607	.242	.240	.204	.165	.645
levelC10	Equal variances assumed	2.241	.138	1.860	98	.066	.340	.183	.023	.703
	Equal variances not assumed			1.860	98.000	.066	.340	.183	.023	.703
levelC11	Equal variances assumed	7.192	.009	1.559	98	.122	.280	.180	.637	.077
	Equal variances not assumed			1.559	82.771	.123	.280	.180	.637	.077
levelC12	Equal variances assumed	4.067	.046	1.775	98	.079	.340	.192	.040	.720
	Equal variances not assumed			1.775	97.248	.079	.340	.192	.040	.720
levelD1	Equal variances assumed	1.191	.278	.476	98	.635	.060	.126	.310	.190
	Equal variances not assumed			.476	90.670	.635	.060	.126	.310	.190
levelD2	Equal variances assumed	3.343	.071	.772	98	.442	.080	.104	.286	.126
	Equal variances not assumed			.772	94.198	.442	.080	.104	.286	.126
levelD3	Equal variances assumed	.279	.599	.264	98	.793	.020	.076	.131	.171
	Equal variances not assumed			.264	97.786	.793	.020	.076	.131	.171
levelD4	Equal variances assumed	4.299	.041	1.016	98	.312	.080	.079	.236	.076
	Equal variances not assumed			1.016	79.387	.313	.080	.079	.237	.077
levelD5	Equal variances assumed	5.266	.024	1.216	98	.227	.140	.115	.369	.089
	Equal variances not assumed			1.216	92.585	.227	.140	.115	.369	.089
levelD6	Equal variances assumed	1.059	.306	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed			.850	95.836	.398	.100	.118	.334	.134
levelD7	Equal variances assumed	1.191	.278	.476	98	.635	.060	.126	.310	.190
	Equal variances not assumed			.476	90.670	.635	.060	.126	.310	.190
levelD8	Equal variances assumed	9.502	.003	1.424	98	.158	.160	.112	.383	.063
	Equal variances not assumed			1.424	88.854	.158	.160	.112	.383	.063
levelD9	Equal variances assumed	1.059	.306	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed			.850	95.836	.398	.100	.118	.334	.134
levelD10	Equal variances assumed	8.775	.004	1.473	98	.144	.160	.109	.376	.056

	Equal variances not assumed			1.473	91.163	.144	.160	.109	.376	.056
levelD11	Equal variances assumed	20.062	.000	1.769	98	.080	.120	.068	.255	.015
	Equal variances not assumed			1.769	49.000	.083	.120	.068	.256	.016
levelD12	Equal variances assumed	1.191	.278	.476	98	.635	.060	.126	.310	.190
	Equal variances not assumed			.476	90.670	.635	.060	.126	.310	.190

Independent samples test (Factors)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
relative1	Equal variances assumed	.058	.811	.632	98	.529	.140	.222	.300	.580
	Equal variances not assumed			.632	97.050	.529	.140	.222	.300	.580
relative2	Equal variances assumed	1.059	.306	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed			.850	95.836	.398	.100	.118	.334	.134
relative3	Equal variances assumed	2.681	.105	1.823	98	.071	.360	.197	.032	.752
	Equal variances not assumed			1.823	96.595	.071	.360	.197	.032	.752
relative4	Equal variances assumed	6.358	.013	.336	98	.738	.040	.119	.277	.197
	Equal variances not assumed			.336	90.303	.738	.040	.119	.277	.197
relative5	Equal variances assumed	2.681	.982	1.260	98	.211	.140	.111	.081	.361
	Equal variances not assumed			1.260	97.819	.211	.140	.111	.081	.361
relative6	Equal variances assumed	1.059	.306	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed			.850	95.836	.398	.100	.118	.334	.134
compati.1	Equal variances assumed	2.681	.105	1.823	98	.071	.360	.197	.032	.752
	Equal variances not assumed			1.823	96.595	.071	.360	.197	.032	.752
compati.2	Equal variances assumed	1.215	.273	.513	98	.609	.100	.195	.487	.287
	Equal variances not assumed			.513	95.421	.609	.100	.195	.487	.287
compati.3	Equal variances assumed	8.482	.004	.933	98	.353	.140	.150	.438	.158
	Equal variances not assumed			.933	87.410	.354	.140	.150	.438	.158
compati.4	Equal variances assumed	.633	.428	.377	98	.707	.080	.212	.341	.501
	Equal variances not assumed			.377	97.126	.707	.080	.212	.341	.501
compati.5	Equal variances assumed	.058	.811	.632	98	.529	.140	.222	.300	.580
	Equal variances not assumed			.632	97.050	.529	.140	.222	.300	.580
complex.1	Equal variances assumed	.355	.553	1.434	98	.155	.440	.307	.169	1.049

	Equal variances not assumed			1.434	97.909	.155	.440	.307	.169	1.049
complex.2	Equal variances assumed	.633	.428	.377	98	.707	.080	.212	.341	.501
	Equal variances not assumed			.377	97.126	.707	.080	.212	.341	.501
complex.3	Equal variances assumed	1.215	.273	.513	98	.609	.100	.195	.487	.287
	Equal variances not assumed			.513	95.421	.609	.100	.195	.487	.287
complex.4	Equal variances assumed	1.059	.306	.850	98	.398	.100	.118	.334	.134
	Equal variances not assumed			.850	95.836	.398	.100	.118	.334	.134
topM.1	Equal variances assumed	.418	.520	.371	98	.711	.100	.269	.635	.435
	Equal variances not assumed			.371	97.932	.711	.100	.269	.635	.435
topM.2	Equal variances assumed	1.595	.210	.755	98	.452	.240	.318	.391	.871
	Equal variances not assumed			.755	97.853	.452	.240	.318	.391	.871
topM.3	Equal variances assumed	.209	.648	.229	98	.820	.060	.262	.461	.581
	Equal variances not assumed			.229	97.930	.820	.060	.262	.461	.581
topM.4	Equal variances assumed	.418	.520	.371	98	.711	.100	.269	.635	.435
	Equal variances not assumed			.371	97.932	.711	.100	.269	.635	.435
topM.5	Equal variances assumed	4.168	.044	1.000	98	.320	.040	.040	.039	.119
	Equal variances not assumed			1.000	49.000	.322	.040	.040	.040	.120
topM.6	Equal variances assumed	1.031	.313	.672	98	.503	.180	.268	.352	.712
	Equal variances not assumed			.672	97.854	.503	.180	.268	.352	.712
topM.7	Equal variances assumed	2.727	.102	1.330	98	.187	.340	.256	.167	.847
	Equal variances not assumed			1.330	97.292	.187	.340	.256	.167	.847
competiti	Equal variances assumed	13.177	.102	1.644	98	.103	.280	.170	.618	.058
ve p. *1*	Equal variances not assumed			1.644	83.503	.104	.280	.170	.619	.059
competiti	Equal variances assumed	.199	.657	.223	98	.824	.060	.269	.594	.474
ve p.2	Equal variances not assumed			.223	97.947	.824	.060	.269	.594	.474
competiti	Equal variances assumed	4.302	.041	1.026	98	.307	.160	.156	.470	.150
ve p. 3	Equal variances not assumed			1.026	89.675	.308	.160	.156	.470	.150
business	Equal variances assumed	.199	.657	.223	98	.824	.060	.269	.594	.474
p.p. 1	Equal variances not assumed			.223	97.947	.824	.060	.269	.594	.474
business	Equal variances assumed	.199	.657	.223	98	.824	.060	.269	.594	.474
p.p. 2	Equal variances not assumed			.223	97.947	.824	.060	.269	.594	.474
business	Equal variances assumed	13.177	.102	1.644	98	.103	.280	.170	.618	.058
p.p. 3	Equal variances not assumed			1.644	83.503	.104	.280	.170	.619	.059
business	Equal variances assumed	.190	.664	.218	98	.828	.020	.092	.202	.162
p.p. 4	Equal variances not assumed			.218	97.959	.828	.020	.092	.202	.162
governme	Equal variances assumed	.007	.932	.728	98	.469	.100	.137	.173	.373
nt.1	Equal variances not assumed			.728	97.996	.469	.100	.137	.173	.373
governme	Equal variances assumed	13.177	.102	1.644	98	.103	.280	.170	.618	.058
nt.2	Equal variances not assumed			1.644	83.503	.104	.280	.170	.619	.059
governme	Equal variances assumed	13.177	.102	1.644	98	.103	.280	.170	.618	.058

nt.3	Equal variances not assumed			1.644	83.503	.104	.280	.170	.619	.059
governme nt.4	Equal variances assumed	1.732	.191	.643	98	.521	.080	.124	.167	.327
	Equal variances not assumed			.643	87.844	.522	.080	.124	.167	.327
governme nt.5	Equal variances assumed	.848	.359	.147	98	.883	.020	.136	.250	.290
	Equal variances not assumed			.147	92.785	.883	.020	.136	.250	.290
governmen t.6		1.732	.191	.643	98	.521	.080	.124	.167	.327
				.643	87.844	.522	.080	.124	.167	.327

Independent samples test (Competitive advantage)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
costredu.1	Equal variances assumed	4.661	.033	1.063	98	.290	.220	.207	.631	.191
	Equal variances not assumed			1.063	85.700	.291	.220	.207	.631	.191
costredu.2	Equal variances assumed	1.777	.186	.661	98	.510	.120	.181	.240	.480
	Equal variances not assumed			.661	94.972	.510	.120	.181	.240	.480
costredu.3	Equal variances assumed	7.300	.008	1.281	98	.203	.280	.219	.714	.154
	Equal variances not assumed			1.281	81.895	.204	.280	.219	.715	.155
costredu.4	Equal variances assumed	1.777	.186	.661	98	.510	.120	.181	.240	.480
	Equal variances not assumed			.661	94.972	.510	.120	.181	.240	.480
costredu.5	Equal variances assumed	.108	.743	.542	98	.589	.060	.111	.160	.280
	Equal variances not assumed			.542	97.044	.589	.060	.111	.160	.280
costredu.6	Equal variances assumed	11.171	.001	1.698	98	.093	.300	.177	.651	.051
	Equal variances not assumed			1.698	80.636	.093	.300	.177	.652	.052
costredu.7	Equal variances assumed	3.674	.058	.775	98	.440	.080	.103	.285	.125
	Equal variances not assumed			.775	85.263	.440	.080	.103	.285	.125
costredu.8	Equal variances assumed	.108	.743	.542	98	.589	.060	.111	.160	.280
	Equal variances not assumed			.542	97.044	.589	.060	.111	.160	.280
costredu.9	Equal variances assumed	.402	.527	.317	98	.752	.080	.253	.422	.582
	Equal variances not assumed			.317	97.381	.752	.080	.253	.422	.582
differe.1	Equal variances assumed	.361	.549	.778	98	.439	.200	.257	.310	.710
	Equal variances not assumed			.778	97.866	.439	.200	.257	.310	.710

differe.2	Equal variances assumed	.320	.573	.761	98	.448	.200	.263	.721	.321
	Equal variances not assumed			.761	96.951	.448	.200	.263	.722	.322
differe.3	Equal variances assumed	8.645	.004	1.486	98	.140	.180	.121	.420	.060
	Equal variances not assumed			1.486	77.823	.141	.180	.121	.421	.061
differe.4	Equal variances assumed	2.922	.091	.827	98	.410	.060	.073	.084	.204
	Equal variances not assumed			.827	57.003	.412	.060	.073	.085	.205
differe.5	Equal variances assumed	.194	.661	.259	98	.796	.040	.154	.346	.266
	Equal variances not assumed			.259	97.079	.796	.040	.154	.346	.266
differe.6	Equal variances assumed	2.854	.094	.368	98	.713	.080	.217	.511	.351
	Equal variances not assumed			.368	92.773	.713	.080	.217	.511	.351
differe.7	Equal variances assumed	.360	.550	.258	98	.797	.020	.078	.174	.134
	Equal variances not assumed			.258	94.819	.797	.020	.078	.174	.134
growth1	Equal variances assumed	2.922	.091	.827	98	.410	.060	.073	.084	.204
	Equal variances not assumed			.827	57.003	.412	.060	.073	.085	.205
growth2	Equal variances assumed	.268	.606	.299	98	.766	.060	.201	.458	.338
	Equal variances not assumed			.299	95.984	.766	.060	.201	.458	.338
growth3	Equal variances assumed	.049	.825	.194	98	.847	.040	.207	.450	.370
	Equal variances not assumed			.194	97.464	.847	.040	.207	.450	.370
growth4	Equal variances assumed	5.451	.022	1.077	98	.284	.100	.093	.284	.084
	Equal variances not assumed			1.077	82.680	.285	.100	.093	.285	.085
growth5	Equal variances assumed	.033	.855	.201	98	.841	.040	.199	.356	.436
	Equal variances not assumed			.201	97.999	.841	.040	.199	.356	.436
growth6	Equal variances assumed	.003	.956	.184	98	.854	.020	.109	.196	.236
	Equal variances not assumed			.184	98.000	.854	.020	.109	.196	.236
growth7	Equal variances assumed	.308	.580	.277	98	.782	.020	.072	.163	.123
	Equal variances not assumed			.277	97.705	.782	.020	.072	.163	.123
quality1	Equal variances assumed	2.310	.132	.687	98	.494	.140	.204	.264	.544
	Equal variances not assumed			.687	94.607	.494	.140	.204	.264	.544
quality2	Equal variances assumed	3.227	.076	.887	98	.377	.120	.135	.149	.389
	Equal variances not assumed			.887	94.308	.378	.120	.135	.149	.389
quality3	Equal variances assumed	4.010	.048	.950	98	.344	.100	.105	.309	.109
	Equal variances not assumed			.950	74.835	.345	.100	.105	.310	.110
quality4	Equal variances assumed	.033	.855	.201	98	.841	.040	.199	.356	.436
	Equal variances not assumed			.201	97.999	.841	.040	.199	.356	.436
quality5	Equal variances assumed	14.275	.855	.887	98	.377	.120	.135	.149	.389
	Equal variances not assumed			.887	94.308	.378	.120	.135	.149	.389
quality6	Equal variances assumed	2.310	.132	.687	98	.494	.140	.204	.264	.544
	Equal variances not assumed			.687	94.607	.494	.140	.204	.264	.544