

1 **Levels of B2B e-commerce adoption and competitive advantage in SMEs: A**
2 **comparison study between Egypt and USA**

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11 Business-to-business e-commerce adoption has become increasingly important for small and
12 medium-sized enterprises, allowing them to gain and sustain competitive advantage. B2B
13 adopted at different levels based on different resource endowments leads to competitive
14 advantage being gained and sustained in proportion to that level of adoption. This study uses
15 structural equation modelling to investigate how levels of B2B e-commerce adoption affects and
16 contributes to gaining and sustaining competitive advantage in both US and Egyptian
17 manufacturing small and medium-sized enterprises. The key finding is that small and medium-
18 sized enterprises can achieve growth in market share and sales that helps them to improve their
19 position in the global market through higher levels of business-to-business e-commerce adoption.
20 Implications of the study, its limitations and directions for future research are also discussed.

21 **Keywords:** B2B e-commerce adoption, competitive advantage, SMEs, US and Egypt,
22 structural equation modelling

23

INTRODUCTION

B2B e-commerce is one of the fastest-growing segments of e-commerce application. It provides many growth opportunities and benefits for firms, such as cost reductions, efficiency improvements, better supplier relationships, access to global markets, new customers and suppliers, productivity improvements, increased profits and gains in competitive advantage (Fauska, Kryvinska, & Strauss, 2013).

B2B e-commerce adoption has increasingly become a requirement for effectively servicing the business needs of small and medium-sized enterprises (Al-Bakri, Cater-Steel, & Soar, 2010). B2B e-commerce can help small and medium-sized enterprises (SMEs) to gain a variety of competitive advantages over other firms and enhance their ability to compete with large organisations in global markets (Scupola, 2003). B2B e-commerce shows much promise for SMEs wishing to expand their markets (Mullane, Peters, & Bullington, 2001).

However, the advantages available from e-commerce rely on its level of adoption by SME's (Lefebvre, Lefebvre, Elia, & Boeck, 2005). The extent to which SMEs are ready to adopt B2B e-commerce is proportionate to the adoption benefits they gain (Lin, Huang, & Burn, 2007). Many extant studies have identified different levels of e-commerce implementation and adoption (see for instance Abou-Shouk, Megicks, & Lim, 2013; Elia, 2009). However, they have not identified the competitive advantages derived by adopting information technology (IT) at each level. This study aims to fill this literature gap.

From a theoretical perspective, a review of the literature shows that most prior studies have focused on a broad and generic view of the adoption of B2B e-commerce by SMEs (Lip-Sam & Hock-Eam, 2011) or on the relationship between IT adoption and competitive advantage (Bhatt, Emdad, Roberts, & Grover, 2010).

Furthermore, in developed countries, B2B e-commerce adoption has been generally successful and a valid option for growing the e-commerce market (Al-Hudhaif &

1 Alkubeyyer, 2011). However, firms in developing countries have not been active initiators of
2 B2B e-commerce (Mensah, Bahta, & Mhlanga, 2005). Although, some researchers such as
3 (Mansell, Pare, & Schmitz, 2003) have predicted the B2B e-commerce could be a new driver
4 of economic development for developing countries.

5 The SME sector, a vital part of the economy in developed countries, is less well
6 established in developing countries (Bouri et al., 2011). The OECD, (2012) reported that
7 more than 95% of enterprises in developed countries are SMEs. These firms account for
8 almost 60% of private sector employment. However in developing countries, the SME sector
9 need more attention in terms of B2B e-commerce levels of adoption to enable them to catch
10 up with their counterparts in the developed countries to enable them to make critical
11 contributions to employment and GDP, and become an essential part of their economy
12 (Ayyagari, Demirguc-Kunt, & Maksimovic, 2011).

13 SMEs in US are an important part of the economy, comprising of more than 5 million
14 businesses, i.e. 99% of all companies. They create about 65% of net new private sector jobs
15 and employ over half of the private sector's employees (OECD, 2012). Additionally, Dean,
16 Digrande, Field, & Lundmark, (2012) stated the US leads the world in B2B e-commerce with
17 American SMEs having widely integrated the internet into their businesses.

18 SMEs are also major job providers in Egypt, contributing a large share of total value
19 added to the economy and providing a great part of the lower to middle-income population
20 with affordable goods and services. Additionally, 97% of Egyptian enterprises are defined as
21 small (employing between 1 and 49 workers) (UNDP, 2005). Recent studies have found that
22 SMEs in Egypt have only adopted basic applications of e-commerce (see for instance Abou-
23 Shouk, et al., 2013; Zaied, 2012).

24 This study uses structural equation modelling to determine the extent to which levels of
25 B2B e-commerce adoption can predict the competitive advantages of SMEs in a cross-

1 country context, comparing a developed economy; namely the USA to a developing country,
2 Egypt.

3 Assuming that each level of B2B e-commerce adoption achieves a different degree of
4 competitive advantage, this paper, in addition to measuring and defining the B2B e-
5 commerce adoption level in manufacturing SMEs, provides a measurement scale of
6 competitive advantage. In the remainder of this research the literature review, conceptual
7 framework and research method followed by data analysis and results will be discussed. This
8 is followed by a discussion of results, conclusion and research implications will be presented.

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10

LITERATURE REVIEW

Levels of B2B E-commerce Adoption

12 There is extensive research published on the adoption of B2B e-commerce. “Stages of growth
13 models” have been frequently cited to describe the use of information systems in
14 organisations (Chan & Swatman, 2004). Theory of e-commerce development stages emerged
15 in the mid-1970, as researchers began to recognise the increasing importance of information
16 systems (IS) within organisations and their expanding role in the businesses world (Gatautis
17 & Neverauskas, 2005). Chan and Swatman (2004) asserted that understanding the growing
18 process of e-commerce implementation by an organisation enhanced its ability to plan and
19 develop the strategy of its information systems. In Table 1 we present some of these models:

20

Author/Year	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
(Moersch, 1995)	No or little access to technology	Available but not suitable for the user	Using technology as supplement	Using some sort of software packages	Technology based tools are more integrated	Technology access and collaboration	Technology is a tool for problem solving
(Burgess & Cooper, 1998)		Technology is used as a promotion tool	Online interaction	Processing transactions			
(Allcock, Annette, Webber, & Yeates, 1999)		Threshold stage	Beginner stage	Internet used to solve business problem	Full use of internet facilities		
(Earl, 2000)	External communication	Internal communication	e-commerce	e-business	e-enterprise	Transformation stage	
(Mckay, Marshall, & Prananto, 2000)	Wait and see approach	Static online presence	Interactive online presence	Internet commerce	Internal integration	external integration	
(Willcocks, 2000)		Basic internet tools	Transacting business	further integration	e-business		
(Nissen, 2001)		Access	E-procurement	Promotional	e-sales		
(Daniel, Wilson, & Myers, 2002)		Developers: operational e-commerce	communicators	Web presence	transactors		
(Rayport & Jaworski, 2002)		Information provider	interaction	Transactions	co-operation or collaboration		
(Rao, Metts, & Mora Monge, 2003)		Presence on the web	portal	Transaction integration	enterprise integration		
(Chan & Swatman, 2004)		E-commerce adoption	Centralized e-commerce	looking inwards for benefits	internet applications		
(Beck, Wigand, & Konig, 2005)		Online advertising	Online sales	Online procurement	EDI with both supplier and customers		
(Stockdale & Standing, 2006)	Landlubbers : have no intention to move to e-commerce	Toe dippers: basic computer needs	Paddlers: passive but there is intention to progress	Waders: moved to electronic environment under pressure	Swimmer: comfortable with many e-commerce applications		
(Gandhi, 2006)		Extensive promotion	interactions between business and its customers	Successful interaction	reaction stage		
(Chen & McQueen, 2008)		information	online marketing	online ordering	online transactions		

		search and emails					
(NCC, 2009)	no internet access	using e-mail and websites as marketing tools	Web interaction with customers	online relationships with business partners	online exchange and an e-marketplace for customers		
(Abou-Shouk, et al., 2013)	Static web presence	interactive online presence	Electronic transaction	electronic integration			

TABLE 1 Levels of e-commerce adoption models

1 As we can see from the above table, the adoption of e-commerce models are presented
2 as stages or levels. SMEs normally start with a simple static website, often called brochure
3 ware. This gives the business an online presence, providing information about the company,
4 its services, and contact details. Then SMEs may introduce a dynamic online presence in a
5 two-way communication channel between the company and its customers, enabling
6 comments and feedback from customers, tailoring their needs and requests for different
7 packages. The third stage incorporates electronic transactions. Here, businesses have online
8 order systems supported by online payment where customers can search, customize, choose
9 and buy online. The final stage is the mature stage, where SMEs electronically integrate their
10 business operations with supply chain partners and suppliers, constituting an online
11 collaboration. It is worth noting that none of these research models address the B2B e-
12 commerce adoption in SMEs across countries and the relations between the different levels of
13 B2B e-commerce, nor the different types of competitive advantage which is the focus of the
14 current study.

15 However Lefebvre et al. (2005) categorized B2B e-commerce business processes
16 (eBPs) into a six-stages model. The current study, adopts Lefebvre et al's. (2005) framework
17 for measuring levels of B2B e-commerce adoption in manufacturing SMEs. However, it
18 excludes the first two stages that are related to non-adopters and the SMEs intending to adopt
19 B2B e-commerce in the future, as this research is delimited to manufacturing SMEs that have
20 adopted B2B e-commerce.

21

22 Competitive Advantage

23 Competitive advantage reflects the company's ability to provide consumers with greater
24 value, either by offering lower prices or by giving more benefits and services that justify
25 higher prices (Berawi, 2004). It is claimed that competitive advantage is a significant factor

1 for firms in all industries (Pavic, Koh, Simpson, & Padmore, 2007). Therefore, ambitious
2 companies should always be concerned with how to achieve and sustain a competitive
3 advantage.

4 IT is one area to have been linked to competitive advantage for SMEs. One goal of
5 using IT is to support the survival of the firm by using internet technologies to keep ahead of
6 competitors and differentiate their position in the global market. The management of firms
7 often consider IT as offering a chance to strengthen the competitive advantage of their
8 organisation (Remenyi, 1991). Many extant studies (Hazen & Byrd, 2012; Pavic, et al., 2007)
9 have focused on the relationship between IT adoption and competitive advantage. These
10 studies conclude that IT is a competitive weapon and promoting IT as a resource enables
11 organisations to obtain a competitive advantage.

12 Furthermore, it is claimed that IT is not only a tool that can be used to obtain a
13 competitive advantage but it also sustains and promotes such advantages (Porter, 1980).
14 Internet commerce technologies are one sub-discipline of IT. In their study of UK SMEs,
15 Pavic et al. (2007) found that e-commerce helped SMEs to create competitive advantages.
16 Moreover, in her study on manufacturing SMEs, Aldhmour (2007) found that information
17 and communications technology (ICT) helps manufacturing companies to sustain their
18 competitive advantage by enhancing their reputation and the quality of their customer
19 service, providing information feedback, lowering costs, and offering good coordination,
20 efficient marketing skills, continuous development, a good relationship with distributors,
21 suppliers and customers, and assisting with technical developments. Therefore, ICT adoption
22 and competitive advantage were found to be strongly and positively related. Correspondingly,
23 N'Da et al. (2008) studied B2B e-commerce advantages for SMEs and found that the increase
24 in productivity, the improved quality of products and services, sales growth and increased
25 revenues are considered to be the greatest advantages. Ussahawanitchakit and Intakhan

1 (2011) investigated Thailand firms' adoption of e-commerce and how it affected competitive
2 advantages. The study found that e-commerce adoption had a positive and significant
3 relationship with competitive advantage. Furthermore, Hazen and Byrd (2012) found that
4 adopting IT produced competitive advantage through increases in levels of efficiency and
5 effectiveness. Although some studies investigated IT adoption and how it affects competitive
6 advantage, they did not distinguish between the types of competitive advantages achieved by
7 the different levels of B2B e-commerce adoption.

8 Competitive advantage and its relation to ICT adoption is broadly covered in the
9 literature in terms of cost reductions, differentiation, growth and quality. Firstly, cost
10 reduction has been revealed as a competitive advantage derived from B2B e-commerce
11 adoption (Krell & Matook, 2009; N'Da, et al., 2008). The latter cited reducing the costs of
12 communications with business partners (e.g., fax, mail, and phone costs, etc.). Reducing
13 inventory costs is another example, given by Lumpkin et al. (2002). Additionally, it has been
14 found that adopting internet technologies reduces the costs of marketing, advertising and
15 sales of products and services (Teo & Pian, 2003).

16 Similarly, N'Da et al. (2008) showed that customer support costs can be reduced by
17 adopting internet technologies, while a reduction in operating costs was revealed by Krell and
18 Matook (2009). Reducing travel expenditure is another type of cost reduction attributable to
19 technology adoption (Lederer et al., 1997). Finally, Teo and Pian (2003), found that SMEs
20 could reduce their document processing costs (e.g., the costs of document storage and
21 manipulation) and document publication costs (e.g., the costs of publishing catalogues and
22 brochures) via internet technology adoption.

23 Secondly, differentiation refers to enhancing the credibility and prestige of the
24 organisation. Providing new products and services to customers is one way of differentiating
25 a company (Teo & Pian, 2003). Another example is increasing the opportunities for

1 customers to customize products and services, as mentioned by Lumpkin et al. (2002).
2 Lederer et al. (1997) cited the examples of speeding up transactions and providing easier
3 access to information for customers. Finally, N`Da et al. (2008) found that enhancing ones
4 brand distinguished the company from its competitors.

5 Thirdly, growth as explained by Teo and Pian (2003) means improving business
6 efficiency. It can also mean increasing the organisation's market share (N`Da et al., 2008),
7 growing the organisation's sales and revenues (Bhatt, et al., 2010) or increasing customer
8 satisfaction (Teo and Pian, 2003).

9 Fourthly, quality as one of the components of competitive advantage, could be achieved
10 in different areas of the organisation, such as product and service quality, information quality,
11 quality of relations with business partners (N`Da, et al., 2008), quality of customer service
12 (e.g., quick responses to customer enquiries, promptly following up customer claims and
13 complaints), and a reduction in transaction errors (Lai, Zhao, & Wang, 2006). All of these
14 could be enhanced by using B2B e-commerce.

15

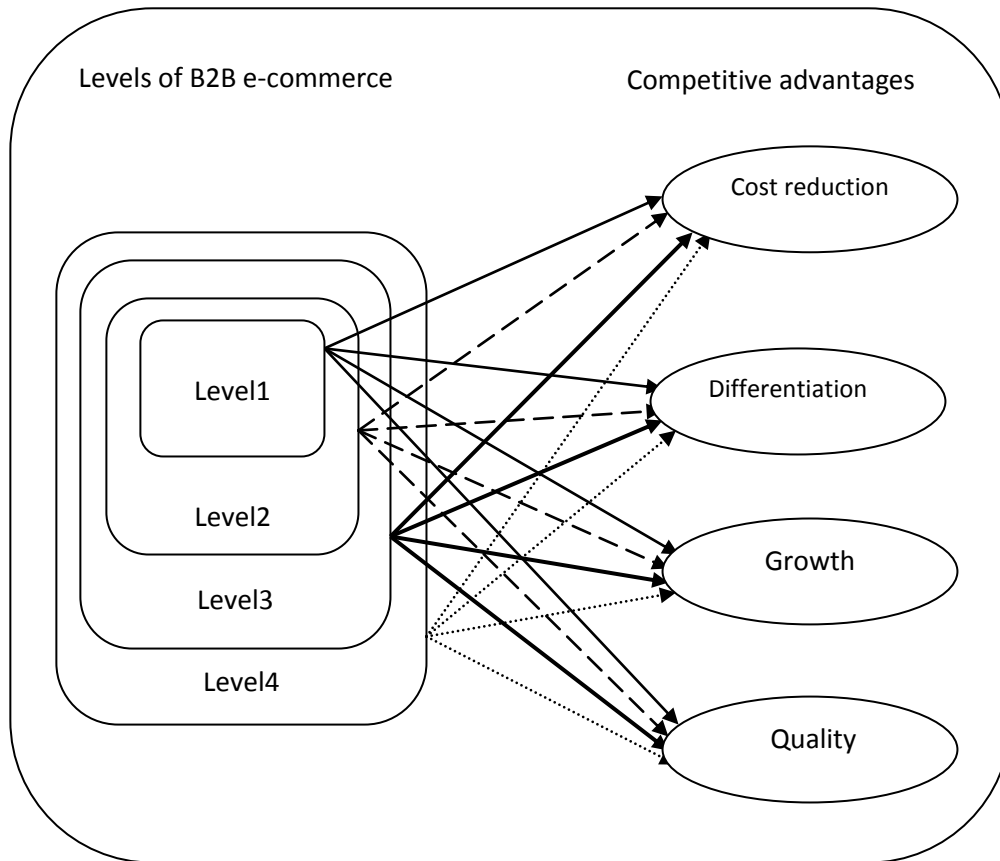
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CONCEPTUAL FRAMEWORK

17 The aim of this research is to investigate how the different levels of B2B e-commerce in
18 manufacturing SMEs affect the the different types of competitive advantage in both Egypt
19 and the US. To address this, a conceptual framework and five main hypotheses have been
20 developed. Figure 1 presents the framework, which is followed on by the set of hypotheses.

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10 FIGURE 1: Research's conceptual framework

11 *Note: Level1: electronic information search and creation, Level2: simple electronic transactions, Level3:*
12 *complex electronic transactions, Level4: electronic collaboration.*

13

14 H1. The first level of B2B e-commerce adoption affects an SME's competitive advantage.

15 H1a- The first level of B2B e-commerce adoption affects cost reduction.

16 H1b- The first level of B2B e-commerce adoption affects differentiation.

17 H1c- The first level of B2B e-commerce adoption affects growth.

18 H1d -The first level of B2B e-commerce adoption affects quality.

19 H2. The second level of B2B e-commerce adoption increases an SME's competitive
20 advantage.

21 H2a- The second level of B2B e-commerce adoption significantly affects cost reduction.

22 H2b- The second level of B2B e-commerce adoption significantly affects differentiation.

- 1 H2c- The second level of B2B e-commerce adoption significantly affects growth.
- 2 H2d -The second level of B2B e-commerce adoption significantly affects quality.
- 3 H3. The third level of B2B e-commerce adoption enhances an SME's competitive advantage.
- 4 H3a -The third level of B2B e-commerce adoption significantly affects cost reduction.
- 5 H3b- The third level of B2B e-commerce adoption significantly affects differentiation.
- 6 H3c -The third level of B2B e-commerce adoption significantly affects growth.
- 7 H3d- The third level of B2B e-commerce adoption significantly affects quality.
- 8 H4. The fourth level of B2B e-commerce adoption improves an SME's competitive
- 9 advantage.
- 10 H4a -The fourth level of B2B e-commerce adoption significantly affects cost reduction.
- 11 H4b -The fourth level of B2B e-commerce adoption significantly affects differentiation.
- 12 H4c- The fourth level of B2B e-commerce adoption significantly affects growth.
- 13 H4d- The fourth level of B2B e-commerce adoption significantly affects quality.
- 14 H5. The higher the level of B2B e-commerce an SME adopts, the higher the level of
- 15 competitive advantage it gains (i.e., cost reduction, differentiation, growth, and quality).
- 16 Finally, we test a hypothesis comparing the effects in Egypt and USA:
- 17 H6. There is a significant difference between the effects of the different levels of B2B e-
- 18 commerce adoption on the competitive advantage in Egypt and the US.

19 In the following section we will discuss the research methodology.

20

21 **RESEARCH METHODOLOGY**

22 This research adopted a mixed methods approach, commonly used by researchers to confirm

23 the findings of the research and minimise the weaknesses of the quantitative and qualitative

24 approaches (Creswell & Clark, 2011). A questionnaire survey was used to collect data from

25 both American and Egyptian SME owner/managers from across the manufacturing sector.

1 The study randomly selected 1280 US manufacturing SMEs (from the Small Business
2 Administration databases - <http://www.sba.gov/advocacy>), and 768 Egyptian (from the
3 statistical database of the Egyptian Ministry of Industry and Foreign Trade -
4 <http://www.mfti.gov.eg/SME/Statistics1.htm>). Only manufacturers with websites were
5 chosen. A total of 320 US and 200 Egyptian responses were collected that were valid and free
6 of missing data, making the response rate 25% for the US and 26% for Egypt.

7 The questionnaire comprised of a series of Likert-type (1-5 *disagree/ agree*) statements
8 informed from the literature review. The level of B2B e-commerce adoption was measured
9 using the classification of eBPs provided by Lefebvre et al. (2005). This included four levels
10 of adoption, namely electronic information search and creation, simple electronic
11 transactions, complex electronic transactions, and electronic collaboration, measured by a
12 total of 36 eBPs. For the competitive advantage constructs (i.e., cost reduction,
13 differentiation, growth, and quality) the study used established measures drawn from extant
14 studies (see Table 2).

15

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

2

3 TABLE 2 Measurement scale for competitive advantage

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5 Once the questionnaire findings were analysed, a series of semi-structured interviews

6 (face to face, and via telephone) were conducted with ten owner/managers (five from each

1 country) to investigate in depth the quantitative results on the differences in the effect
2 relationships. The researchers employed the coding technique adopted by Zhang et al., (2010)
3 and Zhang et al. (2012) where all interviews were transcribed into text files. Then an open-
4 coding technique was used in the analysis to develop the nodes, and categorize into themes,
5 using the Nvivo software. A number of themes were generated that relate to competitive
6 advantages gained by technology adoption alongside the cultural aspects of technology
7 adoption in the two different national environments.

8

9

RESULTS AND DATA ANALYSIS

10 PLS-SEM was used to analyse the data collected due to its capability in handling formative
11 and reflective latent variables (Kock, 2012). SEM is a powerful analytical technique as it
12 combines measurement and structural models into a simultaneous statistical test (Hoe, 2008).
13 The technique is valuable when used with a hypothesis-testing approach and flexible in
14 modelling the causal relationships among multiple predictor and criterion variables. As such,
15 SEM was regarded as an appropriate technique within this study. Using SEM allowed a
16 number of levels of B2B e-commerce adoption to be identified as specific competitive
17 advantages through cause-effect study. The Warp PLS software 3.0 was used to test the
18 measurement and structural models.

19

Descriptive Statistics

21 The descriptive statistics show that the average values of the American responses to the series
22 of competitive advantage orientated statements were 3.42, 3.42, 3.45, and 3.44 for cost
23 reduction, differentiation, growth, and quality respectively, while the corresponding averages
24 for the Egyptian responses were 3.86, 3.78, 3.46, and 3.05.

25

1 Measurement Model

2 The measurement model comprised of tests of the internal consistency reliability, convergent
3 validity, and discriminate validity of the study instruments, which refers to the strength of
4 scales used to examine the suggested model (Hair, Ringle, & Sarstedt, 2011). In this study,
5 the measurement model was tested in two phases as the model has both reflective and
6 formative latent variables, which needed dissimilar analytical processes.

7 First, the measurement was examined for levels of adoption, which were considered as
8 formative latent constructs. Weight statistics must be examined for formative latent variables.
9 Kock (2012) recommends that weights with P values less than 0.05 be considered valid items
10 in a formative construct. Consequently, formative construct items whose weights do not
11 satisfy this standard were excluded. In addition to P values, PLS offers variance inflation
12 factors (VIFs) to further validate the items of construct. As recommended by Kock (2012)
13 and Hair et al. (2011), VIFs must be less than 10 to be valid. From Table 3, it is clear that the
14 American SMEs showed significant responses on all eBPs in all four levels of B2B e-
15 commerce adoption except D4, D7 and D9, thus demonstrating the maturity of adoption
16 among the US enterprises. Among the Egyptian companies, although the Level 1 eBPs are
17 similar to those of the US companies, those at Level 2, 3, and 4 differ, which supports the
18 sixth hypothesis.

19

Independent 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	9.22	
	levelC6	0.04	0.01	<0.01	8.51	
	levelC7	0.04	0.01	<0.01	9.37	
	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	
	LevelD5	0.04	0.01	<0.01	7.02	
	LevelD6	0.04	0.01	<0.01	9.56	
	LevelD8	0.04	0.01	<0.01	6.01	
	LevelD10	0.04	0.01	<0.01	8.36	
	LevelD11	0.04	0.01	<0.01	8.55	
Dependent Constructs (reflective)		Loading	AVE	SQRT AVE	Cronbach's α	CR*
Cost Reduction	CostR1	0.94				
	CostR2	0.95	0.89	0.94	0.96	0.97
	CostR4	0.94				
	CostR7	0.95				
Differentiation	Diff1	0.97	0.91	0.95	0.95	0.97
	Diff2	0.96				
	Diff6	0.94				
Growth	Grow3	0.95	0.91	0.96	0.95	0.97
	Grow6	0.96				
	Grow7	0.96				
Quality	Qual1	0.95	0.920	0.96	0.956	0.972
	Qual2	0.97				
	Qual3	0.96				

2

3 TABLE 3 Measurement model: US context

4 *VIF: variance inflation factor, S.E: standard error, AVE: average variance extracted, CR: composite reliability*

1 From Table 4, it is clear that the Egyptian companies surveyed implemented five eBPs
 2 from B2B e-commerce adoption Level 1. At Level 2, the Egyptian SMEs had implemented
 3 only two and at Level 3; they have implemented five. At Level 4, the Egyptian SMEs have
 4 implemented one process only.

5

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	
Dependent Constructs (reflective)		Loadings	AVE	SQRT AVE	Cronbach's α	CR
Cost Reduction	CostR1	0.93	0.81	0.90	0.88	0.93
	CostR2	0.88				
	CostR6	0.90				
Differentiation	Diff1	0.92	0.89	0.94	0.94	0.96
	Diff2	0.97				
	Diff5	0.94				
Growth	Grow1	0.56	0.67	0.82	0.74	0.86
	Grow3	0.92				
	Grow4	0.93				
Quality	Qual2	0.90	0.78	0.88	0.86	0.91
	Qual4	0.84				
	Qual6	0.91				

6

7 TABLE 4 Measurement model: Egyptian Context

8

9 Second, the measurements were examined for competitive advantage - cost reduction,
 10 differentiation, growth and quality, conceived as reflective latent variables. Tables 3 and 4

1 depict the findings for both American and Egyptian SMEs respectively. For the US, both
2 Cronbach's α and composite reliability for all competitive components were all found to be
3 above the recommended level of 0.70 which indicated a satisfactory internal consistency
4 reliability (Fornell & Bookstein, 1982). They also showed acceptable convergent and
5 discriminate validity. As recommended by Hair et al. (2011), convergent validity is
6 satisfactory when latent variables have an average variance extracted (AVE) of at least 0.5.
7 For acceptable discriminate validity, for each construct, the square root of the average
8 variance extracted should be greater than any of the correlations involving that construct. For
9 Egypt, Cronbach's α and composite reliability for cost reduction, differentiation, growth and
10 quality were also more than 0.70, which again indicated adequate internal consistency
11 reliability. They also illustrated adequate convergent and discriminate validity, as evidenced
12 in Table 4.

13

14

STRUCTURAL MODEL

15 The structural model was used to measure the causal relationships among the constructs, and
16 these relationships among latent variables were hypothesized in agreement with the literature
17 review and reasonable reasoning. Four models were tested to investigate how the four levels
18 of B2B e-commerce adoption affected the competitive advantage of the SMEs (Figures 2a,
19 2b, 2c, and 2d). Within each level, the path loadings, R-squared coefficients (R^2) and effect
20 size (f^2) were assigned to US and Egyptian SMEs.

21

Structural Model for Level 1

23 Regarding Level 1, in American manufacturing SMEs it was found that this level
24 significantly and positively affected cost reduction ($\beta=0.69$, $P<.01$), differentiation ($\beta=0.69$,
25 $P<.01$), growth ($\beta=0.68$, $P<.01$) and quality ($\beta=0.69$, $P<.01$), thus supporting H1, H1a, H1b,

1 H1c and H1d respectively. As for R^2 , it was found that the level of adoption explained 48% of
2 the variance in cost reduction, 48% of the variance in differentiation, 46% of the variance in
3 growth, and 48% of the variance in quality. Regards f^2 , the results of the statistical analysis of
4 the research model indicated that Level 1 adoption has a strong effect on cost reduction,
5 differentiation, growth and quality, which were 0.477, 0.478, 0.462 and 0.480 respectively.
6 For Level 1 in Egyptian SMEs, the paths from Level 1 to cost reduction, differentiation and
7 growth were all found to be positive and had a significant influence ($\beta=0.28$, $P<.01$), ($\beta=0.28$,
8 $P<.01$) and ($\beta=0.47$, $P<.01$) respectively. These results support H1, H1a, H1b and H1c. While
9 Level 1 did not affect quality to support H6, R^2 , showed that the level of adoption explained
10 8% of the variance in cost reduction, 8% of the variance in differentiation, and 22% of the
11 variance in growth. In addition, the results revealed that Level 1 adoption had a weak effect
12 on cost reduction and differentiation, which were 0.079 and 0.081 respectively, whereas it
13 has a medium influence on growth at 0.223.

14

15 Structural Model for Level 2

16 Level 2 in US SMEs had a significant positive effect on cost reduction ($\beta=0.69$, $P<.01$),
17 differentiation ($\beta=0.69$, $P<.01$), growth ($\beta=0.67$, $P<.01$) and quality ($\beta=0.69$, $P<.01$) which
18 supported H2, H2a, H2b, H3c and H2d respectively. Additionally, it was found that the level
19 of adoption explained 48%, 48%, 45%, and 48% of the variance in cost reduction,
20 differentiation, growth, and quality respectively, as illustrated in Figure (2b). The f^2 score
21 indicated that the results for Level 2 adoption has a strong effect on cost reduction,
22 differentiation, growth and quality: 0.477, 0.475, 0.453 and 0.77 respectively.

23 On the other hand, Level 2 adoption in the Egyptian SMEs, had a significant and
24 positive influence on cost reduction ($\beta=0.29$, $P<.01$), differentiation ($\beta=0.32$, $P<.01$), growth
25 ($\beta=0.47$, $P<.01$) and quality ($\beta=0.37$, $P<.04$) supporting H 2, H2a, H2b, H2c and H2d

1 respectively. For R^2 , the Level 2 of adoption explained 8%, 10%, 22% and 14% of the
2 variance in cost reduction, differentiation, growth, and quality respectively, as shown in
3 Figure (2b). Furthermore, the results illustrate that Level 2 of adoption had a medium effect
4 (0.219) on growth, but a weak effect on cost reduction, differentiation and quality, 0.082,
5 0.100 and 0.139 respectively.

6

7 Structural Model for Level 3

8 For the US, Figure (2c) illustrates that Level 3 adoption significantly and positively affected
9 cost reduction ($\beta=0.73$, $P<.01$), differentiation ($\beta=0.73$, $P<.01$), growth ($\beta=0.70$, $P<.01$) and
10 quality ($\beta=0.72$, $P<.01$), supporting H3, H3a, H3b, H3c and H3d respectively. Regards R^2 , it
11 was found that Level 3 adoption explained 53%, 53%, 49% and 52% of the variance in cost
12 reduction, differentiation, growth and quality respectively. In addition, the results show that
13 Level 3 had a large effect on cost reduction, differentiation, growth and quality: 0.529, 0.533,
14 0.490, and 0.523 respectively.

15 For Egyptian SMEs, the results show that the Level 3 had a significant and positive
16 effect on cost reduction, differentiation, growth and quality, ($\beta=0.35$, $P<.01$), ($\beta=0.38$, $P<.01$),
17 ($\beta=0.41$, $P<.01$) and ($\beta=0.34$, $P<.04$) respectively. Thus, the H3, H3a, H3b and H3c and H3d
18 have been supported. For R^2 , it was found that Level 3 explained 12%, 15%, 17%, and 12%
19 of the variance in cost reduction, differentiation growth and quality respectively. Concerning
20 f^2 , the results shows that Level 3 had a medium effect on differentiation and growth and
21 differentiation, 0.15, and 0.168 respectively. However, it had a weak effect on cost reduction
22 and quality, only scoring 0.122 and 0.118 respectively.

23

Structural Model for Level 4

For Level 4 in the US SMEs, the results show that this level of adoption significantly and positively affected cost reduction ($\beta=0.73$, $P<.01$), differentiation ($\beta=0.73$, $P<.01$), growth ($\beta=0.70$, $P<.01$) and quality ($\beta=0.73$, $P<.01$), supporting H4, H4a, H4b, H4c and H4d respectively. In addition, it was found that this level of adoption explained 54%, 54%, 50% and 53% of the variance in cost reduction, differentiation, growth, and quality. For f^2 , the results demonstrate that the Level 4 adoption had a large effect on cost reduction, differentiation, growth and quality: 0.536, 0.536, 0.496, and 0.528 respectively.

Regarding the Egyptian sample, the results reveal that at this level there was a significant and positive effect on cost reduction, differentiation, growth and quality, ($\beta=0.34$, $P<.01$), ($\beta=0.38$, $P<.01$), ($\beta=0.44$, $P<.01$) and ($\beta=0.36$, $P<.04$) respectively. These scores support H4, H4a, H4b, H4c and H4d. Moreover, it was found that Level 4 explained 12%, 14%, 19% and 13% of the variance in cost reduction, differentiation, growth and quality respectively as presented in Figure (2d). For f^2 , the results show that the Level 4 had a medium effect on differentiation and growth, 0.15, and 0.194 respectively, but a weak effect on cost reduction and quality, at only 0.115 and 0.131 respectively.

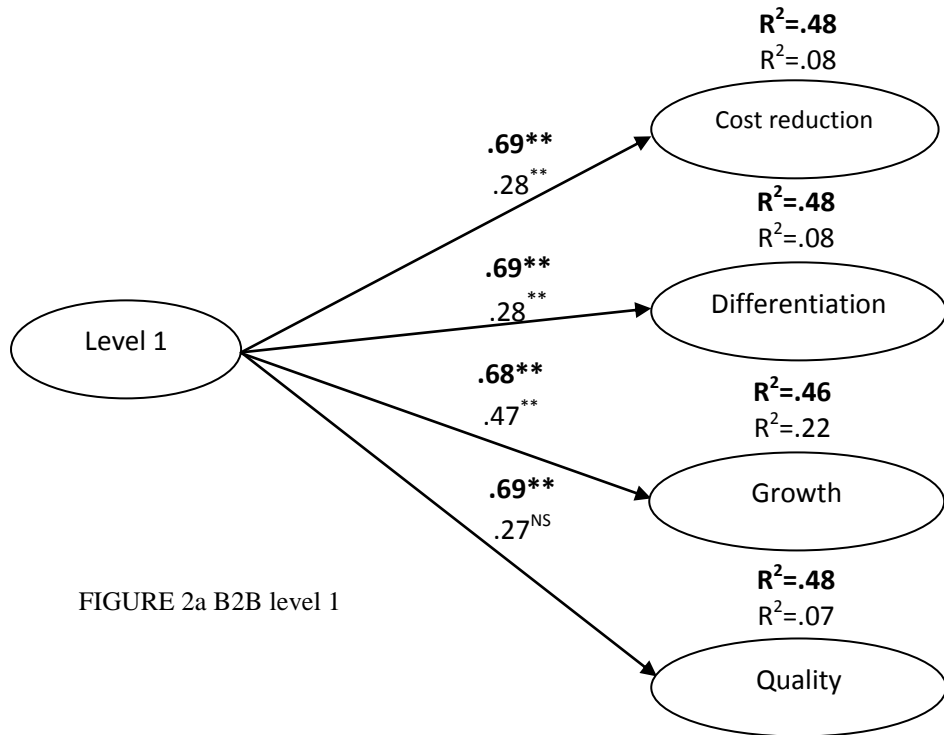


FIGURE 2a B2B level 1

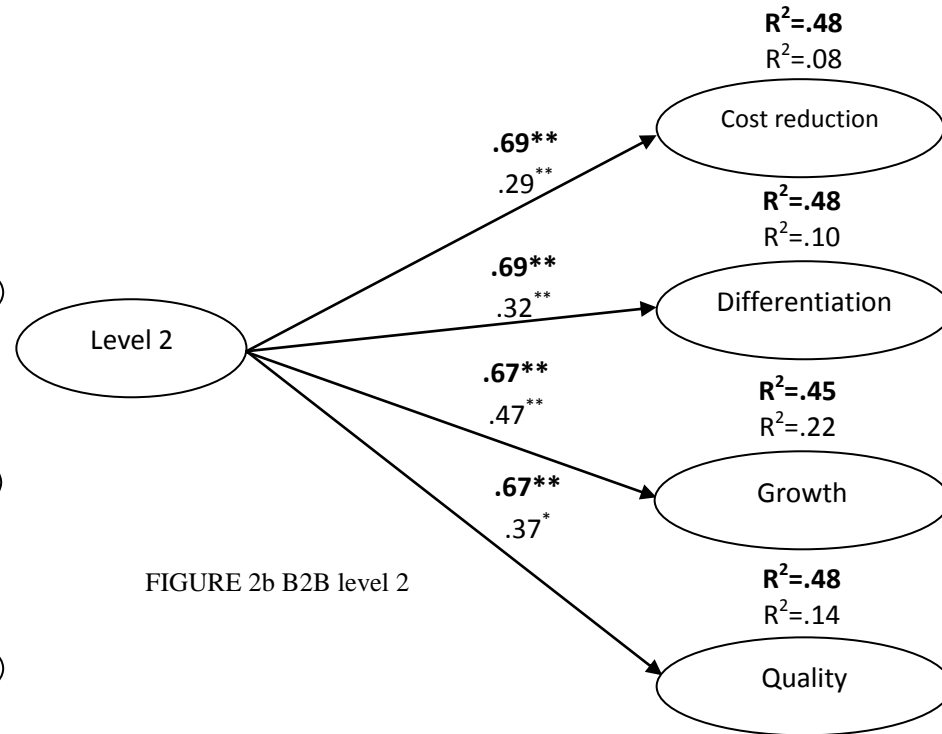


FIGURE 2b B2B level 2

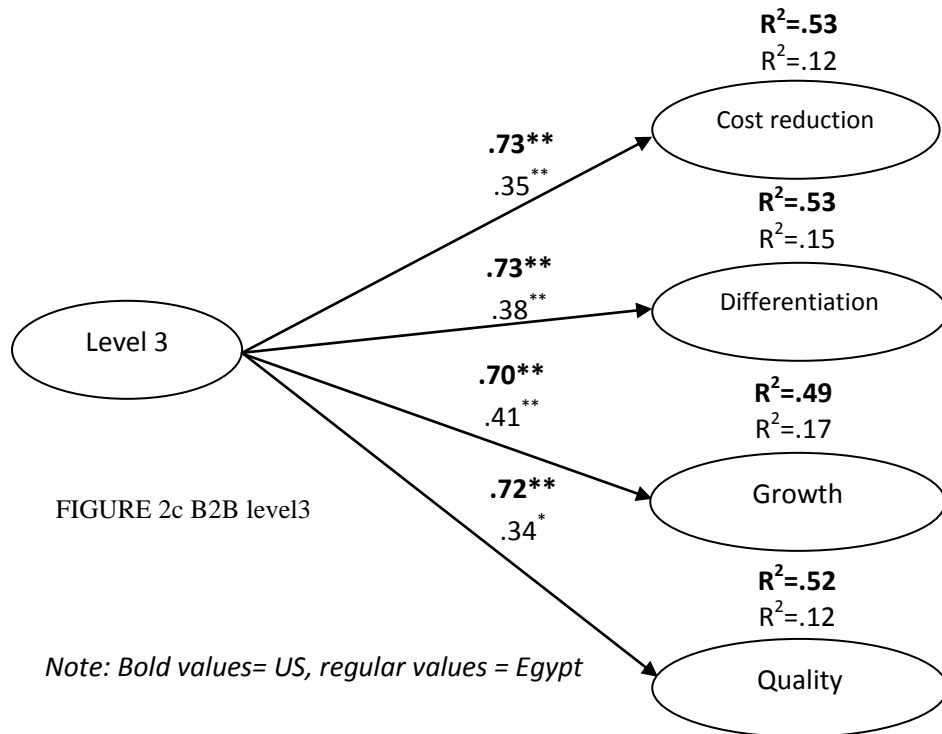


FIGURE 2c B2B level3

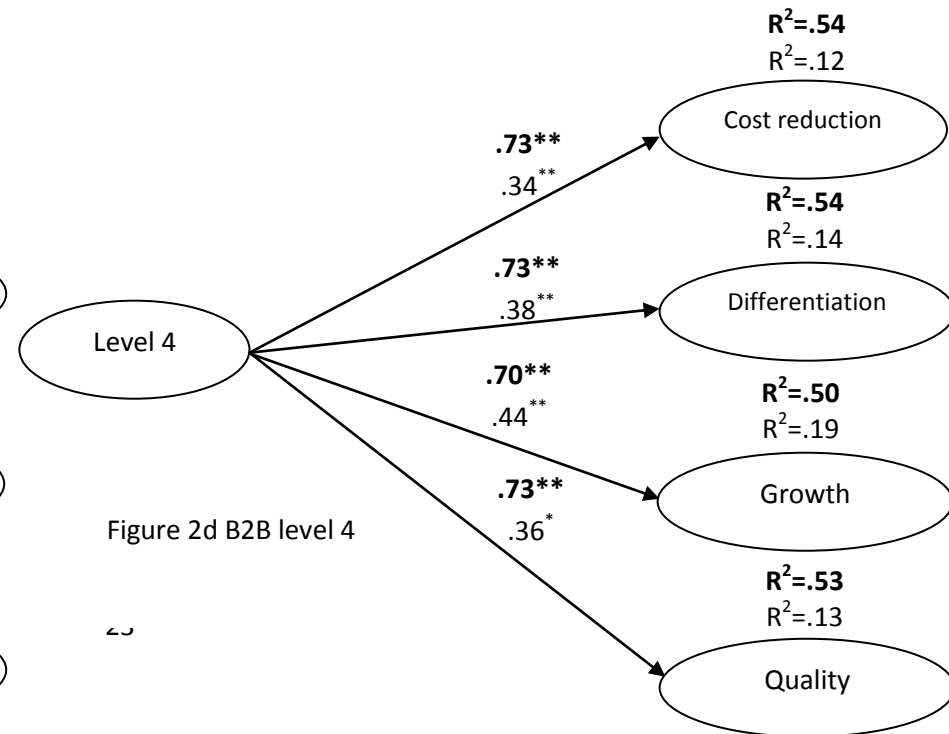


Figure 2d B2B level 4

Note: Bold values= US, regular values = Egypt

1 *Model Fit Indices*

2 Model fit was measured by three criteria: average path coefficient (APC), average R² and
 3 average variance inflation factor (AVIF), which is provided by Warp PLS 3.0 software
 4 (Kock, 2012). Also, P values are provided to average path coefficient (APC) and average R².
 5 It is recommended that if the P values for both APC and R² are lower than 0.05 and AVIF is
 6 less than 10 then these imply that the model has a good fitness with the data (Kock, 2012). It
 7 can be seen from the data in Table 5 that the fit indices meet these criteria, hence suggesting
 8 that both the US and Egyptian models fit with the data.

9

Indices		APC	ARS	AVIF
USA	Model of level 1 of adoption	0.48*	0.44*	7.22
	Model of level 2 of adoption	0.45*	0.46*	6.13
	Model of level 3 of adoption	0.48*	0.50*	7.40
	Model of level 4 of adoption	0.48*	0.51*	7.45
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

10
 11 TABLE 5 Model fit indices

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

13

14 *T-test*

15 Table 6 shows the differences in the levels of competitive advantage gained through B2B e-
 16 commerce adoption by both USA and Egyptian SMEs, obtained from applying a t-test to the
 17 survey results.

18

Paths	$\beta 1$	S.E.1	Eff. Size		$\beta 2$	S.E.2	Eff. Size		p value
Level 1→cost reduction	0.281	0.100	0.08	S	0.690	0.032	0.45	L	<0.05
Level 1→differentiation	0.284	0.101	0.08	S	0.692	0.031	0.48	L	<0.05
Level 1→growth	0.472	0.131	0.22	M	0.680	0.034	0.48	L	0.062
Level 1→quality	0.268	0.197	0.07	S	0.693	0.028	0.48	L	<0.05
Level 2→cost reduction	0.287	0.096	0.08	S	0.391	0.035	0.45	L	0.15
Level 2→differentiation	0.316	0.110	0.10	S	0.689	0.035	0.48	L	<0.05
Level 2→growth	0.468	0.143	0.22	M	0.673	0.037	0.45	L	0.08
Level 2→quality	0.373	0.206	0.14	S	0.690	0.032	0.48	L	0.06
Level 3→cost reduction	0.349	0.085	0.12	S	0.727	0.034	0.53	L	<0.05
Level 3→differentiation	0.382	0.085	0.14	S	0.730	0.034	0.53	L	<0.05
Level 3→growth	0.410	0.155	0.17	M	0.700	0.035	0.49	L	<0.05
Level 3→quality	0.343	0.198	0.12	S	0.723	0.032	0.52	L	<0.05
Level 4→cost reduction	0.339	0.087	0.05	S	0.732	0.032	0.54	L	<0.05
Level 4→differentiation	0.378	0.087	0.14	S	0.732	0.032	0.54	L	<0.05
Level 4→growth	0.440	0.164	0.19	M	0.704	0.034	0.50	L	0.06
Level 4→quality	0.362	0.201	0.13	S	0.726	0.031	0.53	L	<0.05

1

2 TABLE 6 Differences between competitive advantages gained by USA and Egyptian SMEs (results of t-test)

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

4 Table 6 shows that SMEs in the US and Egypt achieved different levels of
5 competitive advantage as a result of adopting B2B e-commerce, except in terms of growth at
6 Level 1, cost reduction, growth and quality at Level 2, and growth at Level 4, where they
7 achieved almost the same level of competitive advantage. These findings show that the SMEs
8 surveyed in both countries may have focused on growth and considered this to be the most
9 valuable form of competitive advantage, followed by quality concerns and cost reduction.
10 Based on the effect sizes (Kock, 2012), it was found that the B2B e-commerce adoption level
11 had a medium-sized effect on growth in Egyptian SMEs and greater effect on all forms of
12 competitive advantage in the American SMEs.

13 It is clear that SMEs focused on achieving competitive advantages relating to
14 customer services and satisfaction. Strategically, many SMEs are interested in achieving a
15 high quality of service, penetrating new markets and expanding their market share so as to

1 achieve growth and provide a better service. Many also wanted to enable customers to
2 customize their services, and sought to replace their traditional methods of doing business
3 with electronic methods to reduce costs and improve their distribution channels. Overall,
4 Egyptian SMEs do not use the full capabilities of B2B e-commerce and therefore, the level of
5 competitive advantage they achieve is still low. Capabilities, resources, cultural concerns, and
6 organisational readiness are most likely to be behind the modest level of adoption of B2B e-
7 commerce. Awareness of the potential of B2B e-commerce could give SMEs the incentive to
8 upgrade their adoption level and so increase their competitive advantage in terms of cost
9 reductions, differentiation of products and services, growth and expansion by increasing their
10 quality of services and products and the way they produce and deliver them.

11

12

DISCUSSION OF RESULTS

13 From the results, it is clear that the American manufacturing SMEs showed significant
14 responses on all eBPs at all four levels of B2B e-commerce adoption, demonstrating the
15 maturity of adoption among US enterprises. However, the Egyptian SMEs are only similar to
16 American SMEs in Level 1 eBPs but differ at Level 2, 3, and 4. These differences in the level
17 of adoption could be explained by a number of factors. According to Abou-Shouk, et al.
18 (2013) and Zaied (2012), SMEs in Egypt are still in the early stages of e-commerce adoption,
19 and are largely adopting basic applications. This translates into different levels of adoption
20 between SMEs in both countries, and in turns leads to different competitive advantages
21 gained. Furthermore, the qualitative research conducted in this study confirmed what was
22 revealed by Elbeltagi (2007) that ‘cultural differences’ could be an explanatory factor for this
23 difference where there is a belief among owners of SMEs in Egypt that more traditional
24 forms of communication (i.e., fax and phones) among enterprises are still more ‘*reliable and*
25 *trustworthy*’ (Egy.S1). Contrary to the Egyptian SMEs, the American SMEs have a culture of

1 *'openness to new innovations'* which means that SMEs that do not adopt such technologies
2 *'will lose their edge'* (US. M1). The level of payment facilities (i.e., bank accounts, debit and
3 credit cards) is another difference between the two countries, where most SMEs in Egypt do
4 not have such facilities to adopt e-transactions (Egy. M2). This proposition is confirmed by
5 Abou-Shouk, et al. (2013) who indicated that very few SMEs in Egypt support e-payment
6 services. On the other hand, US SMEs face different challenges such as *'security concerns*
7 *and lack of regulations'* especially when they deal with international companies (US. S5).
8 Adopting B2B e-commerce Level 1, 'electronic information search and creation', is classified
9 as a beginner level in which SMEs are seeking out new suppliers, product and services and
10 customers, advertising the company, and digitalizing information about products. This result
11 appears to agree with Abou-Shouk et al. (2013) who found that SMEs use the internet to
12 search for customers and/or suppliers, to communicate with and respond to customers, to
13 collect information about their competitors and customers, and to advertise the company and
14 its product and/or services.

15 At the first level of B2B e-commerce adoption, both the American and Egyptian SMEs
16 achieved the competitive advantage of 'cost reduction' in terms of reducing the costs of
17 communication with business partners as well as lower inventory costs. Additional cost
18 reduction within the American SMEs included the costs of marketing products and services,
19 and customer support costs; and for Egyptian SMEs, coordination cost reduction. These
20 results are in line with previous studies by Lefebvre et al. (2005) and Elia et al. (2007), who
21 found that adopting B2B e-commerce achieved these forms of cost reduction.

22 When SMEs adopt the first level of adoption, they also achieve various forms of
23 differentiation. Both SMEs in US and Egypt have achieved provision of new and better
24 products and services to customers. A further form of differentiation achieved by American
25 SMEs included increasing customers' ability to customize products and services, and for

1 Egyptian SMEs, enhancing the credibility and prestige of the organisation. It is clear that US
2 SMEs focused more on customer services. Generally, the results show that adopting B2B e-
3 commerce can help SMEs gain differentiation advantages. These findings are consistent with
4 previous studies (Lederer, et al., 1997), which also found that adopting e-commerce achieves
5 these forms of differentiation.

6 For adoption Level 2, 'simple electronic transactions', results indicate that Egyptian
7 SMEs implemented only two eBPs. They used the internet only for receiving/managing
8 customer orders and offering after-sales services for customers. On the other hand, the
9 American SMEs had fully implemented Level 2 eBPs. This included: accessing suppliers'
10 product/service databases, placing/managing orders with suppliers, using electronic
11 catalogues to buy products/services, accessing customers' product/service databases,
12 receiving/managing customer orders, using electronic catalogues to sell products/services,
13 and offering after-sales services for customers. The maturity level of US over Egyptian SMEs
14 reflects the difference of eBPs adoption in both countries.

15 The results show that both American and Egyptian SMEs achieve the same cost
16 reduction advantages at Level 1. This finding is consistent with Lefebvre et al. (2005), who
17 found that Levels 1 and 2 of B2B e-commerce adoption achieved similar competitive
18 advantages. In the upper and intermediate Level of B2B e-commerce adoption - Level 3,
19 comprising 'complex electronic transactions', the Egyptian SMEs had implemented five
20 eBPs compared to the US where all twelve components were implemented. The five eBPs
21 used by the Egyptian SMEs were negotiating contracts with suppliers, allowing customers to
22 access the company's inventory, accessing suppliers' inventories, selling products and
23 services by responding to electronic calls for tender, and receiving electronic payments from
24 customers. However, the American SMEs had additionally adopted: buying products/services
25 by electronic auction, buying products and services by issuing electronic calls for tender,

1 making electronic payments to suppliers, accessing customers' inventories, allowing
2 suppliers to access the company's inventory, selling products and services by electronic
3 auction, and negotiating contracts (price, volume, and others) with customers. The difference
4 of eBPs adoption could be a result of Egyptian SMEs lacking the resources, capabilities or
5 technical knowledge to fully adopt this level of e-commerce. This was confirmed by Zaied
6 (2012), who found that technical restraints are the most important barriers to e-commerce
7 adoption by Egyptian SMEs. This point is further verified through two of the interviews
8 conducted where it was found that SMEs in Egypt are not independent when they adopt
9 technology and rely on '*external ICT firms' assistance*' (Egy. M5 & S3).

10 When SMEs upgrade to the third level of B2B e-commerce adoption, it was found that
11 SMEs' use of electronic transactions achieved a higher level of cost reduction. The results
12 proved that this is a fact for American SMEs, while the Egyptian SMEs lacking the resources,
13 capabilities or technical knowledge to fully adopt this level of e-commerce had decreased the
14 level of competitive advantage achieved in this level. This was confirmed by Zaied (2012),
15 who found that technical issues are the most important barriers to e-commerce adoption by
16 SMEs in Egypt. Additionally, Hussein (2009) found that company resources affect Egyptian
17 SMEs' decisions regarding e-commerce adoption. The interviews also explained the low
18 level of adoption as emanating from a lack of infrastructure (i.e. *the availability and the slow-*
19 *speed of Internet*) (Egy.S3).

20 At Level 4, 'electronic collaboration', the advanced level of adoption it was revealed
21 that SMEs in Egypt adopted one process of B2B e-commerce, which is returns management,
22 while the US firms adopted all eBPs. These eBPs included transferring documents and
23 technical drawings to suppliers, collaborating in online engineering with suppliers,
24 transferring documents and technical drawings to customers, collaborating in online
25 engineering with customers, integrating software supporting product design (e.g. CAD/CAM,

1 VPDM), automating the production floor using a manufacturing execution system (MES),
2 integrating the MES into the management information system, ensuring the management of
3 quality assurance using the management information system, automating distribution and
4 logistics using a logistics execution system (LES), allowing distribution and transportation
5 partners to access the information they need (Stock Keeping Unit (SKU), quantity
6 turnaround, etc.) in order to reduce distribution time and costs, optimizing returns
7 management, and tracking sold or purchased products during transportation. Generally, the
8 adoption levels of e-commerce in SMEs are in line with the results revealed by Zaied (2012),
9 who found that most SMEs in Egypt have only adopted basic applications of e-commerce,
10 and Abou-Shouk et al. (2013) who reported that SMEs in Egypt adopt low levels of e-
11 commerce. These results reveal how far the Egyptian SMEs are behind their USA peers
12 regarding B2B e-commerce adoption.

13 At Level 4 of B2B e-commerce adoption, the Egyptian SMEs surveyed did not achieve
14 any further competitive advantages as they did not adopt any of eBPs at this level. As for the
15 US firms, there was a small increase in cost reduction. This may result from firms at this
16 stage of e-commerce adoption being more concerned about other advantages, such as growth
17 and quality. The limited contribution to cost reduction could also be due to the increase in the
18 costs of the IT infrastructure required at this level. Furthermore, it is possible that cost
19 reductions will only be noticed in the long term, as confirmed by Poon and Swatman (1999),
20 who showed that the advantages created by IT adoption often take some time to appear. This
21 justification is also confirmed by one of the American SME managers who mentioned that
22 *“[adopting high levels of e-commerce leads to] competitive advantage but the cost of setting-*
23 *up B2B e-commerce infrastructure and maintain[ing] an active website represent a financial*
24 *burden on any SMs either in developed or developing country”* (US.S4).

1 Generally, the higher the level of B2B e-commerce adoption, the higher the level of
2 growth achieved.

3 Results revealed an increase in the level of growth among the American SMEs versus
4 static growth across the Egyptian SMEs. While adopting higher levels of technology helped
5 the American SMEs to increase market share, customer satisfaction, and the penetration of
6 new markets, it helped the Egyptian SMEs achieve enhanced business efficiency, an
7 expanded market share and increased sales. These findings are in line with N`Da et al.
8 (2008), who found that adopting B2B e-commerce assists SMEs to increase sales, growth and
9 revenue. This corresponds with the findings of Elia et al. (2007) who revealed that SMEs
10 who adopt B2B e-commerce derive benefits such as increased revenues, firm efficiency,
11 market share and customer satisfaction. Additionally, Lal (2002) found that B2B e-commerce
12 helps SMEs to access international markets. SMEs adopting a higher level of B2B e-
13 commerce have greater opportunities to expand their market share, sales and revenues. Abou-
14 Shouk et al. (2013) found that adopting an advanced level of e-commerce helps SMEs to
15 create new online distribution channels equivalent to their traditional methods of distribution,
16 further validating the results.

17 Quality, the last dimension of competitive advantage discussed in this study is
18 increased based on the level of adoption. It was found that adopting B2B e-commerce does
19 achieve some indicators of quality, namely fast delivery (both for US and Egyptian SMEs),
20 an increase in the quality of customer service, and an increase in product and service quality
21 (US SMEs), and an increase in information quality, and quality of relations with business
22 partners (Egyptian SMEs). These findings are consistent with the previous study by N`Da et
23 al. (2008), who found that the most important advantage gained from B2B e-commerce
24 adoption is an increase in the quality of products and services. Furthermore, Lefebvre et al.
25 (2005) found that B2B e-commerce adoption helps SMEs to increase customer service

1 quality and reduce delivery time. Additionally, Barrett and Konsynski (1982) pointed out that
2 IT adoption increases the level of collaboration between business partners.

3 As for the differences in quality achieved when adopting different levels of B2B e-
4 commerce, the results reveal that American enterprises achieve significant quality
5 improvements, while the Egyptian SMEs have not achieved quality when adopting at Level
6 1, and have produced the same level of quality through higher levels adoption.

7 To sum up, it is clear that adopting a higher level of B2B e-commerce leads to greater
8 competitive advantage. However, the Egyptian SMEs appear to lag far behind their American
9 counterparts in implementing B2B e-commerce eBPs and thus, achieve lower levels of
10 competitive advantage. The t-test results confirmed that SMEs in the US and Egypt achieve
11 different levels of competitive advantage.

12

13

CONCLUSION

14 The findings reveal that the higher the level of B2B e-commerce SMEs adopt, the higher the
15 level of competitive advantage they gain. However, SMEs in Egypt, as a developing country,
16 are still far behind their peers in developed countries. The survey results indicate that
17 Egyptian SMEs have struggled to upgrade their level of adoption, with many having adopted
18 Levels 1 and 2, a few attempting Level 3, and very few adopted at Level 4. The findings also
19 reveal that SMEs focused more on growth as this allowed them to continue competing in the
20 global market. It allowed them to increase their market share, and this in turn affected their
21 sales and revenue growth. Quality concerns and cost reductions are the forms of competitive
22 advantage targeted next.

23 Accepting the fact that e-commerce can be adopted in different stages (denoted as
24 Levels 1, 2, 3 and 4 in this study), leads to the proposal that each stage will achieve certain
25 competitive advantages or levels of advantages. Furthermore, using both developed and

1 developing country context provides an overall understanding of how the resources of SMEs
2 can be used to generate and sustain competitive advantages in two different environments.
3 Developing countries, which tend to share a lack of infrastructure readiness, a lack of skilled
4 labour, employee resistance to moving from traditional to automated ways of doing business,
5 and customer concerns (readiness, trust, and satisfaction), face a consequent delay in
6 adopting technology and, in turn face strong competition from the global markets in terms of
7 market share, sales, and revenues.

8

9

STUDY IMPLICATIONS

Theoretical Implications

11 In terms of theoretical implications, the study could be considered original in the field of B2B
12 e-commerce at the general level, and in particular B2B e-commerce in manufacturing SMEs.
13 From a critical exposition of the literature it is clear that empirical studies into B2B e-
14 commerce issues across manufacturing SMEs is only starting to emerge (Elia, 2009;
15 Lefebvre, et al., 2005) in developed countries and rarer still in the developing countries,
16 especially the Arab states. In addition, most prior studies have focused on a broad and generic
17 view of the adoption of B2B e-commerce by SMEs, or on the relationship between IT
18 adoption and competitive advantage. This study was conducted in a cross-country context,
19 and has made an original contribution towards the body of knowledge on B2B e-commerce
20 adoption in relation to the identification of levels of B2B e-commerce adoption by
21 manufacturing SMEs and its impact on competitive advantage. Furthermore, the findings
22 confirmed that there are different levels of B2B e-commerce and different competitive
23 advantages gained from each level of adoption. Also, this study contributes to the theory of
24 B2B e-commerce by examining and investigating the phenomenon in the contexts of both US

1 and Egyptian manufacturing SMEs. Consequently, the study contributes to the limited
2 literature on B2B e-commerce in manufacturing SMEs.

3

4 Practical Implications

5 Turning to the practical implications of the study, important implications for the
6 owner/managers of manufacturing SMEs can be drawn from the findings to help them to
7 understand their environments as they move through the different stages of B2B e-commerce
8 adoption in a cross-country business context. In addition to the implication for
9 owners/managers of manufacturing SMEs, this study presents important implications for
10 governmental and non-governmental organisations, as well as other institutions linked to
11 manufacturing SMEs. It is essential for SME managers to realise the influence that B2B e-
12 commerce can have on their firms. SMEs that are hesitant to adopt B2B e-commerce need to
13 examine their situation carefully, as embracing B2B e-commerce is likely to be a necessity
14 for most, if not all, businesses in the near future. They should also acknowledge that the
15 advantages gained from technology adoption often take some time to become noticeable, and
16 this should not discourage SMEs from embracing B2B e-commerce at an early stage. The
17 findings of this study reveal that a higher level of B2B e-commerce adoption creates a greater
18 competitive advantage, and this should motivate owners or managers of SMEs to adopt a
19 high level of technology and become more technologically orientated so as to enhance their
20 competitive position in the market. Additionally, this study shows that the adoption of B2B e-
21 commerce can help SMEs to grow their business. The results show that adoption can increase
22 market share, and this in turn affects sales and revenue. Thus, managers, as the decision
23 makers on adoption, should be encouraged to invest in technology. Meanwhile, technology
24 vendors should target their services at different segments of SMEs based on their current
25 level of adoption. In addition, it would be useful to study manufacturing SMEs situated in

1 other business environments beyond the US and Egypt. This would provide interesting
2 information as to whether the adoption of B2B e-commerce is influenced by the development
3 of a country's economy and would allow IT consultants and vendors to tailor their services
4 and products based on the level of development in that country. The findings of this study
5 should be helpful for multinational companies aiming to start operations in a new country as
6 the study has looked at two opposing environments.

7 Policy makers could use the results of this research to develop more focused policies to
8 motivate SMEs to adopt and/or use a higher level of B2B e-commerce, especially in
9 developing countries, as the findings confirm that SMEs in developing countries such as
10 Egypt are still far behind their peers in developed countries. Therefore, governments consider
11 introducing national initiatives to encourage the adoption of technology by SMEs. This could
12 take two forms. Firstly, promoting awareness of e-commerce and its benefits for SMEs.
13 Secondly, decreasing the barriers to adopting B2B e-commerce, by improving public
14 infrastructure services and the technical support available for SMEs.

15

16

LIMITATION AND FUTURE RESEARCH

17 Similar to other studies, this study has a number of limitations. It focuses mainly on the
18 manufacturing SMEs; however other sectors could be added to future research to add more
19 breadth to understanding this current phenomenon. Another limitation is that the study does
20 not include factors that could explain why SMEs do not achieve higher levels of adoption, as
21 in the case of Egyptian SMEs who are laggards compared to their developed counterparts.
22 Future research could address these limitations with a focus on how top management and
23 governmental policy makers could help SMEs to upgrade to higher levels of e-commerce
24 adoption to allow them to achieve greater competitive advantages.

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