

Empirical Study on adoption and institutionalization of B2B e-commerce in SMEs in Saudi Arabia

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Abstract: Experts and business pundits forecast drastic changes of e-commerce climate in Saudi Arabia when this country became an official member of the World Trade Organization (WTO) in 2005. In fact over a last decade, many Saudi Arabian enterprises have adopted e-commerce, however almost at the entry level. In this research, a research model of e-commerce adoption and institutionalization is developed based on the Technology-Organization-Environment framework. Data collected from 133 small and medium-sized enterprises who are adopters in the country was analyzed. The results showed that (1) major factors affecting on initial adoption of e-commerce were very different from those influencing institutionalization of the technology and (2) experience of small and medium adopters of e-commerce did not significantly influence whether or not they move up towards e-commerce sophistication. Both theoretical and practical implications in promoting e-commerce adoption by SMEs in advanced developing economies, such as Saudi Arabia, are discussed.

Key-words: e-commerce adoption, e-commerce institutionalization, SMEs, Saudi Arabia

1 Introduction

Small and medium size enterprises (SMEs) play a very important role not only in the developed countries but also in the developing economies. Technology and information applications, e-commerce particularly have been becoming an effective means to help SMEs to reinforce their role.

Saudi Arabia has an oil-based economy with strong government control over major economic activities. Like other developing countries; SMEs are the key to unlocking the vast potential of the Saudi Arabian economy. SMEs can provide valuable employment opportunities (around 24.7 percent of total employment), diversify the economy and contribute about 33 percent to the country's GDP. Saudi Arabia has many of supportive programs for both public and private SMEs. The recently announced Ninth Economic Plan seeks to expand further financingsupports to SMEs by increasing the ability of specialized funds and financial institutions and providing various forms of technical assistance. Another solution is to encourage, support, and booster the adoption of ICT, including B2B e-commerce in SMEs. However, SMEs in the Kingdom are still facing many challenges, such as lack of competitive advantage, inability to access capital, a lack of skilled human resources, a lack of market information, and a generally weak policy/regulatory environment. Diffusion and effectiveness in e-commerce activities is relatively slow [1; 2; 3]. E-commerce adoption in almost Saudi Arabian enterprises is still in early stages [4].

There have been few studies conducted to seek to explain the poor situation of e-commerce in KSA, such as [5], [6], and [7]. Unfortunately, all of them were not based on SMEs.

Although there have been previous studies related to the adoption of e-commerce by SMEs around the world. E-commerce adoption depends on specific social, cultural, economic, legal and political context and organizational context. There is still a need for further studies on the e-commerce adoption by SMEs in specific countries. The economy of the King of Saudi Arabia has its unique characteristics that is considered as an advantaged developing economy. Therefore, studies with a focus on e-commerce by SMEs in the country is hoped to contribute much theoretical value to the e-commerce literature.

Respect to that light, the present study was conducted. Using a regionally balanced large sample

of SMEs within KSA, this study addresses three research questions:

- 1) Why have SMEs in Saudi Arabia been so reserved in adopting B2B e-commerce innovations?
- 2) How to improve the poor situation of the B2B e-commerce diffusion in SMEs?
- 3) What are the insights we can learn from within an advanced developing economy?

We will explore various factors that influence the e-commerce adoption process and attempt to understand and explain the phenomenon through the lens of the Technology, Organization, and Environment (TOE) framework.

2 Literature Review

2.1 SMEs and e-commerce within a KSA Context

SMEs are the key to unlocking the vast potential of the Saudi Arabian economy. SMEs can provide valuable employment opportunities to a growing young population improve productivity and help diversify the economy. SMEs have a strong footing within the Kingdom in that they currently make up 90% of all businesses and account for about 24.7 percent of total employment, however, their contribution to GDP remains low with only 33 percent to the GDP. This is in stark contrast to most developed economies. For example in Spain SMEs contribute to 64.3 percent of GDP, or even Austria where SMEs contribute 44 percent [8].

Within the current economic environment, SMEs in the Kingdom face many formidable challenges, which limit their ability to remain competitive and maintain sustained growth. Foremost among SME challenges is their inability to access capital (equity and debt) that is relevant to their particular stage of development. Equity investment is critical for a venture's survival, especially in its early stages. With regard to debt capital, less than 2% of Saudi banks' total lending is going to SMEs compared to over 14% in non-GCC countries. There are many reasons for this situation. Overall, there is a general lack of reliable and accessible information about SMEs. In addition, there is no proven legal environment that allows for collateral registry and legal enforcement in case of default. Finally, most SMEs do not have audited financials and are largely unsophisticated with respect to finance. Other challenges for SMEs include a lack of skilled human resources in business and technical fields, bureaucratic red tape, a lack of market information, and a generally weak policy/regulatory environment.

The Saudi government as well as the private sector has recognized the potential of SMEs and their need for a wide base of support including capital (debt and equity), training and business services. In fact, within the GCC, Saudi Arabia has the largest number of programs to support both public and private SMEs. The recently announced Ninth Economic Plan seeks to expand further supports to SMEs by increasing the ability of specialized funds and financial institutions to provide credit to SMEs, along with providing various forms of technical assistance. Another solution is to encourage, support, and booster the adoption of ICT, including B2B e-commerce in SMEs. E-commerce will potentially help Saudi Arabian SMEs to overcome the existing challenges when combined with other institutional solutions.

With the accession of Saudi Arabia to the World Trade Organization in December 2005, it should be far easier for foreign companies to sell online to Saudis [9]. In Saudi Arabia, however, the penetration of e-commerce is still much lower than the Saudi Arabian contribution to international trade. A survey by King Abdul Aziz City of Science and Technology (KACST) on use of the Internet by Saudi-registered companies revealed that 67% do not have Web access; out of those companies with access, 57% do not use the Internet at all, and only 10% of the Saudi-based companies have a Web presence. Saudi Arabia has a population of over 26 million, but only 1.5 million, or about 5.6% of the total population, have Internet access. By contrast, the UAE has a population of about 2.6 million; about 1.5 million, or 58.5% of the total population, have Internet access [10]. While e-commerce has become a familiar part of life in developed nations, it is still considered as an innovation in the Kingdom of Saudi Arabia (KSA). Despite possessing the largest and fastest growing Information and Communication Technologies (ICT) sector in the Arab region, the KSA has proceeded at a relatively slow pace in the e-commerce area [6]. In 2007, the Saudi Communication and Information Technology Commission (CITC) carried out an extensive study of various aspects of Internet usage in Saudi Arabia, one of which is e-commerce awareness and activity. It reported that only 9% of Saudi commercial organizations, mostly medium and large companies from the manufacturing sector were involved in e-commerce and only 4 out of 10 private companies had their own websites. As for the customers, while 43% were aware of e-commerce, only 6% had ever bought or sold products online, mainly airline tickets and hotel bookings [11]. CITC's IT Report 2010 reiterated

that e-commerce in Saudi Arabia is still in its early stages. In particular, most Saudi retail chains have yet to establish an online channel, and only 8% of Saudi businesses sell online [2]. Familiarization with intention to use e-commerce in Saudi Arabia will allow a better understanding of the millions of potential Internet and e-commerce users. Lack of e-commerce affects the Saudi consumer community, Saudi businesses that wish to sell in local and global markets, international businesses targeting Saudi markets and consequently, Saudi Arabia as a whole.

2.2 Adoption Process of e-commerce innovations

In attempt to identify/assess determinants of adoption of e-commerce technologies, previous empirical studies consider the adoption under a general view and they posit generally decisions of early adoption and of its extent were influenced by the same factors [12; 13; 14; 15]. Very little empirical studies adequately addressed on the progressively multi-process nature of e-commerce adoption. While [16] investigated factors influence on the initial adoption vs. institutionalization of e-commerce in developing countries, [17] focused on supplier's behavior on the post-adoption phase of B2B e-Reverse Auction in Greece. The [18] was to investigate determinants of initial adoption vs. post-adoption of e-business in retail industry. The [19] was a specific study on initial adoption vs. institutionalization of e-procurement in construction industry in developing countries. Their evidence suggests that adoption of e-commerce can be better understood by breaking it down into two levels: entry-level adoption and its sophisticated adoption [16; 17; 18]. Only examining the initial adoption of an innovation cannot understand well post-adoption activities ([18] cited). In fact, many unanswered questions still exist in the literature. For example, given the same the level of resources and operating environment, while several firms have implemented more sophisticatedly e-commerce innovations but others do not [20]. In addition, several enterprises have adopted initially one or multiple simple e-commerce innovations for a long duration, and even though they have mature resources supportive for e-commerce, but they did not conduct any subsequent extent of the technology ([21], pg.98).

Regarding the said research objectives, it is important to distinguish between entry-level adoption of e-commerce and its extent in this present work. The [22] considers the status of e-commerce in enterprises into six phases, namely no e-commerce, connected e-commerce, static e-

commerce, interactive e-commerce, transactive e-commerce, and integrated e-commerce. In which, the entry-level adoption of e-commerce is referred to connected e-commerce or static e-commerce and institutionalization of e-commerce is referred to interactive e-commerce, transactive e-commerce, or integrated e-commerce. This definition is not rigorous enough when it regards only on a sophisticated degree of the adoption under the technological angle.

Here, we posited the notion of the extent of e-commerce adoption proposed by [20]. Accordingly, based on a review of theories of innovation adoption models and IS research, they considered the sophisticated level of e-commerce along with four dimensions, namely assimilation, internal interoperability, external interoperability, and management integration (Figure 1). The extent of assimilation is from awareness to general employment the intended innovation into businesses. Internal interoperability refers to the organizational alignment among e-commerce innovations implemented and between e-commerce innovations and other existing organizational systems. External interoperability is referred as the network linkages between the firm's e-commerce system with its external information systems through transactive or integrated websites, or e-platforms; it expresses a continuously expanding e-network by the enterprise. Management integration is referred as integration between e-commerce system with organizational structure, business strategy as well as organizational culture. Based on this notion, e-commerce initial adoption and institutionalization are defined. E-commerce Initial Adoption refers to the early level of e-commerce adoption in which only one or several of simple e-commerce innovations deployed for a small part of the enterprise's business activities; and only the static or interactive websites developed to make promotions and publish basic company information or receive queries, e-mail, and form entry from users. E-commerce Institutionalization refers to the sophisticated level of e-commerce system deployed in terms of assimilation, internal interoperability, external interoperability, and management integration [22][20].

3 Research Model and Hypotheses

There are three related but distinct research questions: (1) what factors influence on initial adoption of e-commerce in SMEs? (2) What variables influence institutionalization of e-commerce technologies in SMEs? Especially, does

initial adoption experience have significant effects on the institutionalization of e-commerce? The conceptual model is developed towards these objectives.

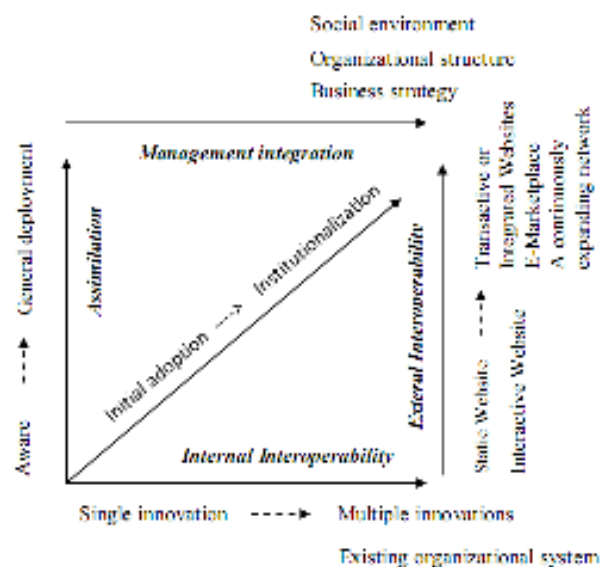


Figure 1 - Initial Adoption vs. Institutionalization of e-commerce [20]

3.1 The Conceptual Model

The model was developed based on the Technology, Organization, Environment framework [23]. Perspective of perceived environment supports (PES) has four components: government supports, market forces supports, related industries supports, and socio-economic and knowledge infrastructure. Perspective of perceived organizational supports (POS) has five factors: resources, commitments, governance, top managers' IT ability and perception, and top managers' leadership style. Perspective of perceived technological supports (PTS) has two elements, namely perceived benefits and perceived risks. As discussed, two levels of adoption are identified: initial adoption and institutionalization [20]. This conceptual model was discussed in detail in [24] and is depicted in Figure 2.

3.2 Research Hypotheses

3.2.1 Perceived Environmental Supports & hypotheses 1 to 3

Government Supports

Government support for e-commerce takes various forms from country to country. However, generally,

it reflects the way and the role of government and its institutions in orienting, supporting, regulating and managing, and monitoring e-commerce environment. It includes four facets: strategic directive role (having visions or macro plans and commitment), practical directive role (having e-Government initiatives), management role to stop or eliminate risks in e-transaction (legal documents, regulations), and supporting role (supporting policies regarded to human, finance, and technique) [24].

Empirical evidence also shows government e-readiness (in term of supportive policies and e-government initiatives, etc.) is one of the key factors to determine decision-making of adoption and institutionalization of e-commerce [15; 16; 25]. In addition, firms may perceive the level of governmental support differently. The impact of government's directions on innovation adoption is empirically argued to be higher on adopters than non-adopters [26]. Further, in less developed or developing countries competitive environment is often determined by the relationship between businesses and government [27], and business managers in SMEs often trend to be directed by government and less willing to accept changes [28]. Once e-government initiatives are implemented, government's role often changes from simply informational to transactional. As a result, the government becomes both supplier and consumer therefore contributing to the growth of e-commerce ([7] cited). In Saudi Arabia, people tend to feel more confident in business ventures if they are backed by the Government [29]. Therefore:

Hypothesis 1a&b: Government support contributes significantly (and is positively related) to (a) initial adoption of e-commerce and (b) the institutionalization of e-commerce in SMEs.

Market Forces Supports

Market forces support is referred to the supportive and incentive factors to adopt e-commerce from a firm's competitors, customers, suppliers, and other business partners. It is reflected by, for instance, a strong trend of cooperation and collaboration, adopting e-commerce in competitors and other business forces (e.g. suppliers, customers, government institutions), and integration within supply chain [16; 24].

E-commerce activities respond to the network principles in the social-business system of the enterprise. In other words, firms' potential for e-commerce is a function of their operating environment, including economic, social, and

political factors. Organizations that perceive market forces as ready for e-commerce are likely to adopt e-commerce or implement e-commerce at the more sophisticated level [30]. The level of take-up by suppliers and customers may have a corresponding effect on a firm's commitment to e-commerce. However, it is argued that such pressures tend to be less likely for some businesses in developing or less developed countries' context [31].

For SMEs in relationships with large firms, the motivation to adopt is fuelled by the integration of trading partners into organizational extranets. Large companies are increasingly outsourcing many of their requirements, and e-enabled SMEs have the ability to respond more quickly to changing demands than their large counterparts enabling them to take advantage of outsourcing opportunities ([32] cited).

Empirical evidence shows that pressures from an enterprise's external business environment (suppliers, clients, competitors, and partners) emerged as the most significant factor affecting the level of institutionalization of e-commerce adoption in developing countries [16]. Additionally, the [18]'s empirical study revealed that the intensity of competition in an industry and international business scope is positively associated to an extent of e-business use in firms. However, in contrast, [33] found that competition exerts little influence on the adoption of new technologies or of e-commerce in small enterprises. Therefore, we propose:

Hypothesis 2a&b: Market forces support contributes significantly (and is positively related) to (a) initial adoption of e-commerce and (b) institutionalization of e-commerce adoption in SMEs.

Related Industries Infrastructure Supports

The conduct of e-commerce depends on a number of support-giving industries. The development of such industries creates advantages by making available efficient, rapid, and sometimes preferential access to e-commerce inputs ([16] cited). Although e-commerce-supporting industries can include most aspects of an economy, four industrial infrastructures are critical in developing or less developed countries, include technology and information infrastructure, banking and financial system, telecommunication infrastructure, and transportation infrastructure [24; 34].

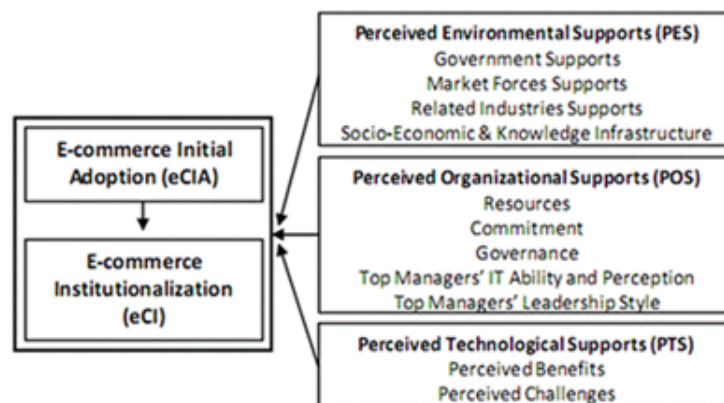


Figure 2 -The adoption of e-commerce by SMEs in Saudi Arabia

Technology infrastructure is required to overcome the technological challenges (i.e. interoperability, security, inadequate software, connectivity, and reliability); it includes three key technological aspects: IT applications and Internet infrastructure, B2B e-initiates, and G2B e-initiates. Information infrastructure refers to information resources in the industry to support the business communication among enterprises as well as between the enterprises with public institutions. It includes two information aspects: industrial economic information and institutional information [34; 35; 36]. Literature consistently acknowledges that information and technology infrastructures are important issues for e-commerce. In developing countries, e-commerce adoption has been generally constrained by the quality, availability, and cost of accessing IT infrastructure, poor industry standards, poor cross-disciplinary communication [37], and especially lacking of the readiness of institutions to govern and regulate e-commerce ([22] cited). Researchers argue that developing countries need to put in place G2B e-initiatives in its policies in order to maximize and encourage e-commerce initiatives among the private sector [38]. Empirical evidence shows that related industries' infrastructure is positively associated to the internet-based purchasing application assimilation [39] and the institutionalization of e-commerce in developing countries [22; 25].

Firms likely perceive the e-commerce readiness of these industries differently, so there may be variations in e-commerce adoption and institutionalization. Therefore, we propose:

Hypotheses 3a&b: Related industries' support contributes significantly (and is positively related) to (a) initial adoption and (b) institutionalization of e-commerce in SMEs.

3.2.2 Perceived Organizational Supports & hypotheses 4 to 8

Internal organizational characteristics refer to a series of internal factors that differentiate an enterprise with others, such as employee's knowledge and skills, organizational culture, resources, organizational structure, size, strategic orientation and model, top managers' commitment, policies, products and services' characteristics, etc. [23; 27; 40; 41].

Resources

It includes four types of organizational resources. (1) Business resources – covers a wide range of capabilities and most of the intangible assets of the organization; for examples: the openness of organizational communication; risk-taking behavior, existing business relationships, and funding to finance e-Commerce projects. (2) Human resources – refers to the availability (accessibility) of employees with adequate experience and exposure to information and communications technology (ICT) and others kills (such as marketing, business strategy) that are needed to adequately staff e-Commerce initiatives and projects. (3) Technological resources – refers to the technology infrastructure of an organization and assesses the extent of computerization, the flexibility of existing systems and experience with network based applications. (4) Information resource – refers to accessible of information, the level of digitalization of inform [24].

Lack of resources remains a barrier to SME e-commerce participation. Empirical evidence shows that the human, technological, cultural, and structural readiness is crucial to both facilitating or impeding initial adoption and subsequent institutionalization of e-commerce [18; 42]. Small

size and lacking internal expertise (knowledge and skills) were identified as two of the main factors hindering adoption of e-commerce by enterprises [13; 15; 16]. In addition, differences in resources could lead to variations in the level of e-commerce implementation in enterprises [43]. Empirical studies identified qualified employees and financial capability [44], IT resources [45], and organizational culture [40] affect significantly initial e-commerce adoption or defining its level of sophistication. Therefore, we propose:

Hypothesis 4a&b: Organizational resources contribute significantly (and are positively () related) to (a) initial adoption and (b) the institutionalization of e-commerce in SMEs.

Commitment

“Commitment” is referred as supports made by key members of the organization, especially its CEO, to champion e-commerce. It should be reflected by the presence of a clear-cut e-commerce vision and a strategic orientation on the entire organization (in terms of employees, business strategy, structure) towards e-commerce [24].

Studies of information systems (IS) consistently acknowledge that commitment (managerial and organizational) is a key influencing factor as well as a critical success factor of IS projects [27]. Other empirical studies also revealed that the strategic orientation of the enterprise (e.g. engaging in strategy analysis and planning, globalization) was a key organizational factor that influences positively the adoption of e-commerce [46; 47; 48]. Further, literature consistently agrees that top manager’s commitment plays an important role in making decisions of both adoption and utilization of e-commerce [16; 17]. Most IT projects fail or will not progress beyond entry level if the absence of top management commitment [27]. In other words, building and maintaining the momentum of commitment is crucial to adopting and institutionalizing e-commerce. Therefore,

Hypothesis 5a&b: Commitment is positively related to (a) the initial adoption and (b) institutionalization of e-commerce in SMEs in the KSA.

Governance

It refers to the strategic, tactical, and operational model that defines the way organizations structure to establish objectives, allocate resources, and make decisions. Regarding e-commerce adoption, it defines the priority as well as influences on how well an organization manages the transition to e-commerce, the integration of e-commerce to

business, and move to e-commerce institutionalization [24]. Organizational governance was empirically identified as a significant factor influencing on adoption of e-commerce and its extents [16; 49]. Further, while governance models become important once an organization has decided to take the first step to adopt e-commerce, they are sorely lacking in SEMs. Therefore, we propose:

Hypothesis 6a&b: Governance contributes significantly (and is positively related) to initial adoption (a) and the institutionalization (b) of e-commerce in SMEs.

Top Managers’ e-Commerce Ability and Knowledge

Top managers’ e-commerce ability and knowledge refer to leaders’ perception, comprehension, and projection of the benefits, risks, and risks of e-commerce adoption. Based on the related literature, we can consider top managers’ e-commerce ability and perception under four aspects: perception of the e-commerce trend of the operating environment, awareness of e-commerce readiness within their enterprise, knowledge of e-commerce, and IT and change management knowledge [20; 24]. According to the Theory of Reasoned Action (TRA) that was developed in an attempt to explain individuals’ behavior through the impact of attitude [50], the most important determinant of an individual’s behavior is behavioral intention. In turn, behavioral intentions are influenced by perception through personal or attitudinal factors and social or normative factors. The theory of technology diffusion consistently agrees that awareness of an innovation, its benefits and risks, and success and failure cases is an important initial factor that may affect the decision to adopt or reject the innovation [30; 51]. Further, after adopting e-commerce at the simple level, a firm more likely expands beyond entry-level functionality if top managers are clearly aware of the strategic potential of e-commerce as well as a strong e-commerce trend within the operating environment.

Empirical evidence shows that the knowledge of the information technologies and e-commerce possessed by managers has a significant effect on the adoption of e-commerce [15; 33; 52]. In additional, evidence also shows that top managers’ perception of environmental e-commerce trends (i.e. e-commerce in competitors, suppliers, and business partners) likely influence on initial e-commerce adoption and institutionalization of the technology [16; 25].

In Saudi Arabia, a study was carried out on e-commerce awareness in 2007 and reported that only 9% of Saudi commercial organizations, mostly medium and large companies from the manufacturing sector were involved in e-commerce and only 4 out of 10 private companies had their own websites [11]. As a result, we propose the following hypotheses:

Hypotheses 7a&b: Top managers' e-commerce ability and knowledge influence significantly on (a) initial adoption and (b) intended institutionalization of e-commerce in SMEs.

Top Managers' Leadership Style

Refers to the personal factors related to top managers that might make differences between them with others. It includes three facets: risk-taking leadership style, IT-oriented leadership style, and strategic-oriented leadership style [24].

Literature argues that in SMEs, their owners/managers play a dominant role in deciding e-commerce implementation. It is believed that no aspiration or the manager is not opened to new technology, it is most likely that the firms are not adapting to e-commerce. In addition, managers in SMEs tend to have diversified objectives; it means that they only consider obtaining minimum level of income, rather than maximizing their profits. This should also be seen as a barrier to SMEs from obtaining greater benefits from e-commerce to improve their business performance. Empirical evidence also suggests that there is a clear link between top managers' positive attitude towards IT and adoption and success of innovation, especially in SMEs [15; 25; 33; 53; 54]. Therefore, a consideration of top managers' leadership style will be critically important for understanding the adoption of e-commerce in SMEs. Here we propose:

Hypotheses 8a&b: Top managers' leadership style has significant influences on (a) initial adoption and (b) institutionalization propensity of e-commerce in SMEs.

3.2.3 Perceived Technological Supports & hypotheses 10 and 11

The Diffusion of Innovations [30] - a theory of how, why, and at what rate a new technology spread within a social context- posits that innovations as being communicated through certain channels over time and within a particular social

system. Individuals or organizations form an attitude toward the innovation itself that leads to a decision to adopt or reject the innovation. In addition, according to [23], relative advantage, compatibility, and complexity are considered as innovation characteristics that are salient to this attitude formation. Relative advantage (reflects perceived benefits) is the degree to which an innovation is perceived as better than its precursor; it provides an incentive for SMEs to adopt the technology. Compatibility is the degree to which an innovation is perceived to be in keeping with previous experience and existing values, and with the needs of possible adopters. Complexity refers to perceived difficulty to implement and use the innovation. The technical know-how required for e-commerce can prevent its adoption. Obviously, take an overall view, one can consider that compatibility and complexity together reflect perceived challenges in adopting and implementing e-commerce and would negatively influence decisions to adopt the innovation. Therefore, we defined the major construct of Perceived Technological Supports as the degree to which managers believed that potential risks (referred to security, standard, trust, and cost) in adopting e-commerce would be solved and that the adoption and institutionalization of e-commerce would bring positive and competitive benefits (referred to improved management, competitive advantages, improved image) for their business [24]. Therefore, we propose:

Hypotheses 9a&b: Perceived benefits influence significantly on (a) initial adoption and (b) institutionalization of e-commerce in SMEs.

Hypotheses 10a&b: Perceived risks influence significantly on (a) initial adoption and (b) institutionalization of e-commerce in SMEs.

3.2.4 Initial Adoption Experience vs. Institutionalization of e-Commerce

Implementing e-commerce technologies is an organizational learning process. Learning and integrating e-procurement innovations into the purchasing process is a challenge for organizations. The state of e-procurement in organizations can change over time; firms may move towards more sophistication but may also give up e-procurement in the future. The [16] surmised that experience with initial e-commerce adoption is likely to have a mediating effect on the degree of institutionalization. Although, [25]'s empirical study shows that there is not a significant relation between initial adoption and institutionalization propensity of e-procurement

in construction industry in Vietnam, in this present study, we will still want to examine the following hypothesis in the specific context of Saudi Arabian SEMs:

Hypothesis 11: Initial adoption experience of e-commerce has significant effects on the institutionalization of e-commerce in SMEs.

4 Research Methodologies

4.1 Sample

Data was collected in the King of Saudi Arabia (KSA). This study investigates influencing factors of adoption and institutionalization of B2B e-commerce in SMEs as well as assess if a causal relationship exists between an initial adoption vs. its intended institutionalization. Therefore, the targeted SMEs should be B2B e-commerce adopters those who at least have their own websites.

Data collection was performed via a multistep process. Firstly, the website at http://www.saudiayp.com/category/Small_business accessed on 20 June 2013 which lists all 6909 small and medium enterprises in the KSA, was used as an initial contact source. Next, we grouped all SMEs who have their own websites listed in this page to make a new list of 762 SMEs that is considered as a population for this present study. At this point, the researchers used parallel two methods. First, based on the random systemic sampling technique (every 5 items) we have collected 70 small and medium enterprises, and then an interview invitation email and the questionnaire were electronically sent out to them by the researchers to introduce the research project. Only 14 out of these fifty enterprises agreed to participate in the project. On the other hand, the researchers used the help of twelve professors from King Saud University – College of Business Administration in Riyadh, the King of Saudi Arabia to reach enterprises. They provided a list of 62 managers from enterprises but only 32 managers from appropriate enterprises who belong to the population (i.e. small and medium firms having their own websites). Then, calls or emails were sent out to introduce the research project and ask interviews. There have been 25 out of the 32 managers agreed to participate in the project. In next step, the researchers made calls directly to the 39 firms (i.e. 14 ones from the first technique and 25 ones from the second method) who agreed previously to make an appointment (date and time) for interviews later. Then the researchers have

visited each enterprise and administered the questionnaire in person. After each initial interview, participants were asked to suggest other participants that might be willing to participate in the research and so on with other participants. The snowball process provided about 180 additional potential participants, and 94 out of them participated in the project. The entire process of selection provided 133 responses during two months from June to July, 2013.

In this study, the research framework consists of 10 independent latent variables. One of formatively measured variables is Related Industries Support “RIS” were measured by five formative indicators; other remaining formative variables were measured by only from two to four formative indicators. Therefore, according to a rule of thumb used in PLS-SEM [56], the minimum sample size should be 100 samples.

In order to address the problem of consistency motif, the questions measuring the independent constructs were placed before the question measuring the dependent variable [57]. The statements are designed that a response of strongly agreement will generate the highest score of 5 points in the Likert five-point scale. Respondents were key leaders who understand in depth and clearly about their enterprise as well as the external e-commerce context, such as senior managers, IT office’s managers, and marketing office’s managers to provide valid and suitable data.

4.2 Response rate and profile of respondents and respondents’ organizations

There have been only 133 completed questionnaires from 250 businesses agreed an appointment were collected, refined, and coded. The response rate is 53%. Of these 133 responses, thirty-eight were from senior managers, sixty-two were from procurement managers, and thirty-three were from marketing managers. Five of them have Ph.D. degrees; sixty-two of respondents have a Master degree; and the remaining respondents have Bachelor degrees. A majority of about 75% respondents has at least 3 years of working experience at the his current position. Considering the profile of the respondents and their enterprises, it can be said that the responses can be confidently relied upon. There have been fifty-seven SMEs in manufacturing industry, fifty-four in service sector, fifteen in construction sector, and remaining seventeen SMEs in other industries represent 43%, 41%, 11%, and 5%

of the total of responses respectively. Most enterprises (90%) have number of year of operation greater than 5 years. All enterprises of the sample admitted that they have their own websites and use one or several of e-commerce innovations in business activities. It implies that all firms of the present sample should be considered as adopters. Table 1 shows the related information in detail.

4.3 Measurement of Variables and Instrument Validation

The operationalization of the research variables was developed using an instrument designed for this study (see [24]). The total of 49 items was used to

measure 13 latent variables; both types of formative and reflective measurements were used to specify latent variables (see table 2). The instrument was rigorously tested for validity and reliability, as discussed in [24] by the same authors.

5. Empirical Analysis

The model was tested using the PLS-SEM technique. We chose PLS because our research is still at an early stage and the proposed model has not been tested in the literature. PLS is appropriate for handling both reflective & formative constructs [58].

Table 1- Category of firms in terms of the level of e-commerce adoption

| Category | Simple e-commerce innovations implemented | Many e-commerce innovations implemented | Total |
|---|---|---|-------|
| Static or interactive websites | 96 | 31 | 127 |
| Transactive or integrated websites and connect to e-platforms | 0 | 6 | 6 |
| Total | 96 | 37 | 133 |

Table 2. Variables in the Conceptual Model

| Independent Latent Variables | Type | Items (*) |
|--|------------|----------------|
| <i>Perceived Organizational Supports</i> | | |
| Resources (Reso) | Formative | Reso1 to Reso4 |
| Commitment (Comt) | Reflective | Comt1 to Comt5 |
| Governance (Gov) | Reflective | Gov1 to Gov4 |
| Managers' IT Ability and Perception (MAP) | Reflective | MAP1 to MAP3 |
| Managers' Leadership Style (MLS) | Reflective | MLS1 to MLS3 |
| <i>Perceived Environmental Supports</i> | | |
| Government Supports(GovS) | Reflective | GovS1 to GovS6 |
| Market Forces Supports (MFS) | Reflective | MFS1 to MFS7 |
| Related Industries Infrastructure Supports (RIS) | Formative | RIS1 to RIS5 |
| <i>Perceived Technological Supports</i> | | |
| Perceived Benefits (PB) | Reflective | PB1 to PB3 |
| Perceived Risks (PR) | Formative | PR1 to PR4 |
| Dependent Latent Variables | | |
| E-commerce initial adoption (eCIA) | Reflective | eCIA1 to eCIA2 |
| E-commerce Institutionalization (eCI) | Reflective | eCI1 & eCI5 |
| A total number of items | | 49 |

*Items measured on a five-point Likert scale ranging from "Strongly Disagree" (value =1) to "Strongly Agree" (value =5).

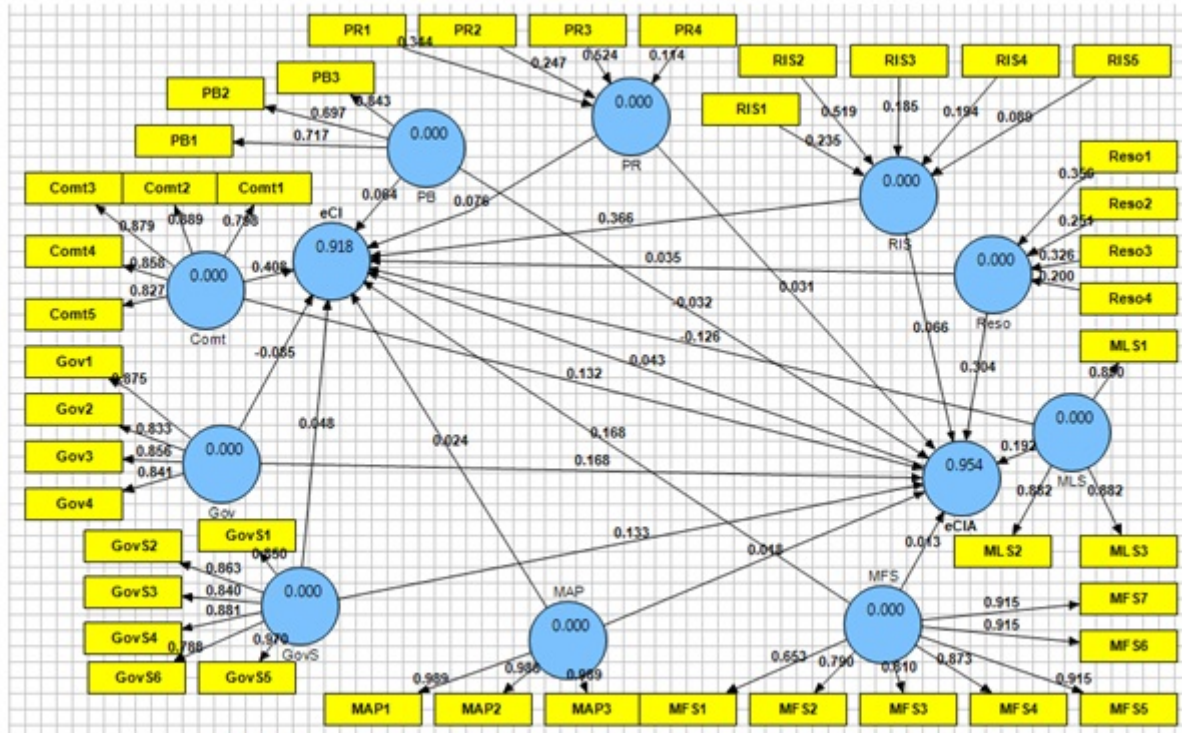


Figure 4 – The results of data analysis of the research model

$$F = \frac{R^2/k}{(1 - R^2)/[n - (k + 1)]}$$

5.1. Test of Predictive Validity of the Structural Model

In [24], we showed that the measurement model has good individual item reliability, convergent validity, discriminant validity (for reflectively measured constructs), and has good weights and loadings, good nomological network effects, and no multicollinearity (for formatively measured constructs). Therefore, the measurement model demonstrates sufficient robustness needed to test the relationship among the latent variables and the dependent variables. Here, the structural model is assessed next to determine the explanatory power of the model through examining the amount of variance in the dependent variable that can be explained by the model. Smart-PLS 2.0 M3 provided the squared multi correlations (R^2) for two dependent variables in a model. In this study, the R^2 for “e-commerce initial adoption” and “e-commerce institutionalization” are 0.91 and 0.95 respectively (see Figure 3) meaning that about 91% and 95% of the changes in the entry-level adoption and institutionalization of e-commerce in SMEs is due to the eleven latent variables in the model.

The significance of the R^2 value was also conducted by F test of significance recommended ([57]):

Where

N – is the total number of the sample size (n = 133 in our study)

K – is the number of predictor latent variables for the dependent variables (k = 12 in our study)

F – is distribution with degrees of freedom k and (n-k-1) (12 and 120 in our study)

We have $F = 92.1$ for $R^2 = 0.91$ and $F = 100.3$ for $R^2 = 0.95$. From the table of F-test critical values, we have $F_{0.01, 12, 120} = 3.449$. This implies that the explanatory power of the model developed is statistically significant at $\alpha = 0.01$, demonstrating the predictive relevance of the structural model. The strong statistical power enhanced our confidence in the result of hypotheses testing in the next section.

The structural model was also assessed by exploring the change in R^2 to see whether the impact of a particular latent variable on each of two dependent latent variables has a substantive impact. The effect size of f^2 can be calculated [57]:

$$f^2 = (R^2_{included} - R^2_{excluded}) / (1 - R^2_{included})$$

Where: $R^2_{included}$ and $R^2_{excluded}$ is R^2 provided on the dependent variable when the predictor latent variable is used or omitted in the model. The effect of a predictor variable is small at the structural level if f^2 is 0.02; to be medium if f^2 is 0.15; and to be large if f^2 is 0.35. The summary and inference on f^2

estimate for the independent latent variables is presented in Table 3. The significance of f^2 statistic was also examined. Pseudo F test for testing the significance of f^2 statistic was employed by calculating F as follows:

$$F = (f^2)(N - m - 1)$$

Where: N – is the total number of the same size; m – is the number of predictors of the dependent variable and F – is distributed as a distribution with degrees of freedom 1 and $(N-m) = (1, 122)$ and $(1, 121)$ for eCIA and eCI, respectively. Table 3 shows that of the twelve predictors of “institutionalization of e-commerce”, the effect sizes of RSI, MLS, Comt, and PB were significant. And of eleven predictors of “initial adoption of e-commerce”, the effect sizes of Reso, Comt, MLS, Gov, and GovS were significant.

Now, it can be summarized that the research model and its instrument are sufficiently valid to

explain adoption and institutionalization of e-commerce in SMEs.

5.2 Paths of the Structural Model

Each hypothesis was tested by looking at the sign, size, and statistical significance of the path coefficient between the independent and dependent variable. The bootstrap function in Smart-PLS 2.0 M3 was used with 200 re-samples.

Nice of the twenty-one paths are statistically significant (see Table 4). For e-commerce initial adoption (eCIA), five of the eleven TOE factors – GovS, Reso, Comt, Gov, and MLS - have significant paths. For institutionalization of e-commerce (eCI), four of the twelve TOE factors – Comt, RIS, MFS, and PB – have significant paths.

Table 3- Results of effect size (f^2) analysis

| Dependent variable | Independent variable | $R^2_{included}$ | $R^2_{excluded}$ | Effect size (f^2) | Inference | F | Sig. Level |
|---------------------------------------|------------------------------------|------------------|------------------|-----------------------|-------------------------|------------------------|------------|
| e-Commerce Institutionalization (eCI) | GovS | 0.921 | 0.917 | 0.017 | small to medium effect | 2.01 | 0.04 |
| | RIS | 0.921 | 0.888 | 0.360 | large effect | 15.0 | 0.00** |
| | Reso | 0.921 | 0.919 | 0.017 | small effect | 2.40 | 0.08 |
| | MLS | 0.921 | 0.910 | 0.124 | Small to medium effect | 3.50 | 0.09 |
| | MFS | 0.921 | 0.902 | 0.205 | Medium to large effect | 6.80 | 0.05* |
| | MAP | 0.921 | 0.918 | 0.027 | small to medium effect | 3.06 | 0.1 |
| | Comt | 0.921 | 0.886 | 0.386 | large effect | 17.1 | 0.01** |
| | Gov | 0.921 | 0.916 | 0.055 | Small to medium effect | 3.10 | 0.06 |
| | PB | 0.921 | 0.909 | 0.135 | small to medium effect | 5.05 | 0.05* |
| | PR | 0.921 | 0.919 | 0.013 | small effect | 2.05 | 0.13 |
| | eCIA | 0.921 | 0.908 | -0.14 | Small to medium effect | -2.88 | 0.22 |
| | e-Commerce Initial Adoption (eCIA) | GovS | 0.957 | 0.955 | 0.049 | small to medium effect | 9.77 |
| MFS | | 0.957 | 0.955 | 0.019 | small effect | 1.75 | 0.32 |
| RSI | | 0.957 | 0.955 | 0.02 | small effect | 1.46 | 0.09 |
| Reso | | 0.957 | 0.953 | 0.188 | medium effect | 15.39 | 0.01** |
| MAP | | 0.957 | 0.956 | 0.024 | small to medium effect | 1.88 | 0.12 |
| MLS | | 0.957 | 0.955 | 0.049 | medium effect | 8.76 | 0.04* |
| Comt | | 0.957 | 0.957 | 0.000 | Medium to larger effect | 12.55 | 0.05* |
| Gov | | 0.957 | 0.954 | 0.073 | small to medium effect | 10.63 | 0.03* |
| PB | | 0.957 | 0.956 | 0.024 | small to medium effect | 1.88 | 0.10 |
| PR | | 0.957 | 0.956 | 0.024 | small to medium effect | 1.88 | 0.9 |

Legend: (*) significant effect; (**) very significant effect

Table 4. Path Coefficients and t Values

| Path | Expected sign | Path coefficients | t-values | Inference |
|---|---------------|-------------------|----------|-----------|
| Dependent construct: E-commerce Initial Adoption (eCIA) | | | | |
| H1a: GovS->eCIA | + | 0.13 | 1.75* | Supported |
| H2a: Reso ->eCIA | + | 0.28 | 3.50** | Supported |
| H3a: Comt ->eCIA | + | 0.16 | 1.99* | Supported |
| H7a: Gov ->eCIA | + | 0.14 | 2.19* | Supported |
| H9a: MLS ->eCIA | + | 0.16 | 2.45* | Supported |
| Dependent construct:E-commerce Institutionalization (eCI) | | | | |
| H3b: Comt ->eCI | + | 0.43 | 3.73** | Supported |
| H6b: RIS ->eCI | + | 0.34 | 4.21** | Supported |
| H8b: MFS ->eCI | + | 0.21 | 2.53** | Supported |
| H11: PB ->eCI | + | 0.10 | 1.97* | Supported |

Legend: **=highly significant, *=significant; critical t-value: 1.96 $p < 0.05$ and 2.58 $p < 0.01$

6 Discussions

Our study makes two notable points: (1) the determinants of initial adoption of e-commerce are very different from those of institutionalization of technology; (2) experience with initial adoption of e-commerce does not have any significant effect on consequent implementation of the technology in SMEs in Saudi Arabia' context. These findings are now discussed in detail.

6.1 Environmental factors

Government supports

Data analysis showed that GovS had significant influence a decision of initial adoption of e-commerce but did not have any impact on e-commerce institutionalization in SMEs. This finding is completely consistent with the result reported by [25] and the conventional wisdom that emphasizes the influence of the macro-environment on entry-level e-commerce adoption [16]. It does not support the empirical argument of [26] is that the impact of government's directions on innovation adoption is higher on adopters than non-adopters. This difference can be caused by a focus on SMEs of the present study. In developing countries, competitive environment is often determined by the relationship between businesses and government [27], and business managers in SMEs often trend to be oriented by government's directions and less willing to accept changes [28]. In the King of Saudi Arabia, people tend to feel more confident in business ventures if they are backed by the Government[29].

Therefore, this finding indicates that SMEs in KSA more likely move to e-commerce at the entry-level if they receive enough government's supports in terms of regulation, laws, financing, and technical issues, however a decision of e-commerce maturity and sophistication in SMEs will depend much more on other factors.

Related Industries Supports

The finding of the study suggests that telecommunication, finance and banking, transportation/logistics infrastructures all have a significant effect on institutionalization of e-commerce adoption but do not influence initial e-commerce adoption. This is consistent with previous empirical evidence on e-commerce adoption in developing countries [22; 25; 39]. Regarding the KSA's context, this result is supported by the findings of [59] is that the level of availability of Wi-Fi and broadband services influenced significantly on only stage 4 (with transactive or integrated websites) of e-commerce adoption process. The results can be explained by the present specific facts in the KSA. The supporting industries have been invested and developed well enough to incentive and support SMEs in the country in adopting and deploying simple e-commerce activities, such as email, static or interactive websites. According to [60], the banking and financial system is continuing to develop and grow in strength and sophistication. Saudi banks have made tremendous progress in terms of offering innovative products and services, introducing sophisticated technological delivery channels including ATMs, Internet and Phone Banking. Banks have set up advanced payment and settlement systems, including Automated Clearing Houses and real time gross value electronic funds transfer systems. The introduction of technologically

advanced systems has resulted in significantly improving the level and quality of customer service, a reduction in transactional costs and increase in efficiencies and strengthening controls. A major achievement of the Saudi Banking system has been in areas of human resources, where banks have continued to increase the use of Saudi citizens. However, e-commerce supporting infrastructure issues are still main concerns and challenges for SA enterprises to deploy more sophisticated e-commerce innovations that require high integration in management and interoperability in technology. In a 2010 e-readiness report, SA has been ranked only 52nd out of the 70 countries surveyed under criteria such as the quality of ICT infrastructure, the ability of government and its institutions, businesses, and people to use ICT [61]. Previous studies also suggested that e-payment mechanisms and systems in the KSA need to be invested and developed much more to provide alternative trustworthy easy-to-use e-payment options to support people and businesses to conduct e-payment [61].

Market Forces Supports

Market forces supports were found to have significant effects on only institutionalization of e-commerce adoption in SMEs. This finding is completely consistent with the results reported by [5], [22] and [52]. It be also supported by [25] when they found that external business characteristics were critical factors affecting the institutionalization of e-procurement in construction industry in Vietnam. They confirm the importance of meso-level environmental factors in e-commerce adoption, as market forces tend to be relatively specific to a given sector and industry. This result indicates that the extent to which e-commerce is used by different business partners can motivate more sophisticated e-commerce implementation in SMEs because of perceived benefit values or fear of market displacement or forces from partners towards supply chain integration. In the KSA, enterprises consider consumer purchasing power as weak and not support them to run e-commerce. They are just waiting to see how the e-marketplace develops [61].

6.2 Organizational factors

Resources

Resources of a company emerged as the most significant factors affecting the entry-level adoption

of e-commerce but not influencing the level of maturity of e-commerce adoption in SMEs. This observation is totally supported by [22] and [25] in developing countries' context. Many other previous studies also empirically confirmed the critical role of organizational resources in general adopting e-commerce but it is worth noting that these studies were conducted based on a macro rather than a process view of e-commerce adoption [18; 40; 44; 45; 52]. Respect to the specific context of the KSA, this present finding does not support the results reported by [59]' study that the level of ease for individual companies to do e-commerce, nature of the products companies sell, the level of e-commerce knowledge and familiarity in companies, business priority, level of trust on e-transaction in companies were found not to significantly influence entry-level stages (1, 2, and 3), but have impacts on only stage 4 (with transactive or integrated websites) of e-commerce maturity. One possible explanation is that our study was a main focus on SMEs to which resources are always key concern.

Our finding indicates that internal management resource, business resource, human resource, technology and information resources are major factors affecting a company's making a decision of entry-level e-commerce adoption; however it will be not sure for the consequent implementation of e-commerce.

Commitments

Out of all influential factors analyzed, only top management commitments was found to have significant effects on both initial e-commerce adoption and institutionalization in SMEs. This finding is consistent with the results of [59] that management attitude towards e-commerce in companies has impacts on both stage 3 (with static or interactive websites) and stage 4 (with transactive or integrated websites) of e-commerce maturity in the KSA. Many researchers have found lack of top managers' commitment as one of the main barriers affecting IT implementation [27; 46; 47; 48]. It implies that for SMEs in developing countries, the commitment of its top managers will drive how far and how fast it adopt and then moves up the maturity degree of e-commerce. In other words, building and maintaining the momentum of commitment is crucial to adopting and institutionalizing e-commerce.

Governance

Organizational governance is another significant factor affecting initial e-commerce adoption only but not to the consequent more complex and

sophisticated implementation of e-commerce in SMEs. This variable was empirically identified as a significant factor influencing on both adoption of e-commerce and its extents [16; 49]. One possible explanation is that the operational model that defines the way organizations structure to establish objectives, allocate resources, and make decisions is much simpler in SMEs than in large companies. Therefore, organizational governance is more critical for entry-level e-commerce adoption than for more sophisticated implementation of the technology. This finding shows us a clear and natural difference between SMEs and large companies in adopting and institutionalizing e-commerce.

Top Managers' IT management ability and leadership style

Data analysis showed that top managers' role was not critical in making a decision of e-commerce adoption in SMEs. While their IT management ability and knowledge was found not to have significant impacts both initial e-commerce adoption and institutionalization in SMEs, their leadership style was found to be a significant influencing factor for entry-level e-commerce adoption only. This finding is not supported by the conventional wisdom that emphasizes important roles managers play in the adoption and utilization of the e-commerce among SMEs. It is also not consistent with previous empirical evidence [25; 52; 63]. This can be explained that because of demands of organizational resources, government supports, and market e-readiness in the KSA may be overwhelming in comparison with these internal factors.

6.3 Technological factors

Perceived Benefits and Risks

While perceived benefits were found as a significant factors affecting a decision of institutionalization of e-commerce only, perceived risks were found not to have any influence either initial e-commerce adoption or its extent in SMEs. This observation is partly supported by [59] – a study in the KSA that revealed that setup and maintenance costs of e-commerce has significant influence only stage 4 (with transactive or integrated websites) of e-commerce adoption process. This result is at odds with other previous studies on SMEs [15; 52; 63]. However, it should be noted again that these studies

were carried out based on a macro rather than a progressively multi-phased view of e-commerce adoption. From this finding, it can be surmised that entry-level adoption of e-commerce occur in SMEs in the KSA mainly because of market forces from business partners and government as well as fear to be replaced by competitors rather than their perception of potential benefits (e.g. reduced cost, expanded market share, enhanced public relations, improved image) and risks (e.g. cost, compability, security, trust, etc.). Additionally, initial adopters of e-commerce more likely moves up the maturity level when they are aware of potential benefits of e-commerce sophistication.

7 Implications

7.1 Theoretical Implications

Firstly, accompany with a few previous studies [25; 59], this study confirmed empirically that the determinants of initial adoption are different from those of institutionalization. Therefore, this study also showed that a process-based view of e-commerce adoption is a necessary and effective approach to understand well the diffusion and adoption of e-commerce technologies in developing countries' context. Most previous research were based on the macro view of e-commerce adoption, as a result they did not explain appropriately the fact is that many enterprises have become adopters of e-commerce but they have not implemented, even did not have any plan to move up towards more complex and sophisticated e-commerce system.

Finally, this study was one of very few of studies conducted in advantage developing economy as the King of Saudi Arabia; it brings the e-commerce literature an unique empirical evidence for such environmental contexts.

7.2 Practical Implications

Improve the supports of Government

The study showed that the government's roles in promoting e-commerce is essential in terms of ensuring coherent policy for IT and e-commerce for consumer protection; secure, transparent, predictable, and enable environment; support, coordination, collaboration, and cooperation. Very few SMEs will move into the e-environment

without substantial encouragement from government. The level of e-commerce activity amongst SMEs remains low and firms are rarely proactive in extending their levels of use. There is a lack of confidence and trust in their ability to master the technology. SEMs in the KSA expect government and supporting industries to offer effective supports.

Within the Gulf Country Council (GCC), Saudi Arabia has the largest number of programs to support both public and private SMEs. The recently announced Ninth Economic Plan seeks to expand further supports to SMEs by increasing the ability of specialized funds and financial institutions to provide credit to SMEs, along with providing various forms of technical assistance ([9]). In the KSA, the existing national laws do not contemplate the use of modern means of communications, especially lack of clear rules and procedures to protect the rights of people and enterprises in e-transactions ([61]cited). The existing lack of government responsibility for e-commerce as the Ministry of Commerce and the Ministry of Communication and Technology Information together deny their main role in developing e-commerce infrastructure ([61] cited). Therefore, a specific government body for legal issues and e-commerce infrastructure in general must be established soon in the country, so that strategic action plans to develop an e-commerce based economy are comprehensively built.

Improve the supports of operational clusters to SMEs

We found that factors from the business environment played a critical role in making a decision of institutionalization of e-commerce in SMEs in the KSA. This implies that a dynamic environment with a strong trend of cooperation and collaboration within both domestic and international markets and the positive e-commerce attitudes of business partners in supply chains (e.g. competitors, suppliers, customers, and government institutions) need to be taken into account in making strategic e-commerce plans by SMEs. In addition, SMEs need more specific helps through local area initiatives to encourage them to be more active in e-commerce. These helps should come from a range of stakeholders including larger business partners, local business associations, educational institutions, local government, and government bodies. Finally, SMEs need to actively integrate more widely and deeply into their supply chains, so that they will receive much more supports from their operational clusters.

Improve the internal supports within SMEs

Lastly but equally importantly, the result of the study showed that internal resources, commitment supports, flexible governance, and positive leadership style of key managers to champion e-commerce played a critical role in adopting e-commerce at the entry level. Therefore, in order to take potential benefits and advantages of e-commerce, first SMEs in the KSA need to actively improve themselves before thinking of waiting for external supports.

8 Conclusions

Analysis and interpretation of the findings have led us to the following conclusions about e-commerce adoption in SMEs: (1) Within the advantage developing countries' context, supports of government are more critical in pulling SMEs towards the entry-level adoption rather than the institutionalization of e-commerce. This role appears through a clear-cut e-commerce vision, commitments, well-defined legal systems, specific supporting policies and incentives to SMEs across industries nationwide, and improved institutional information resource. (2) All the organizational characteristics are more influential on a decision of initial adoption than on the institutionalization of e-commerce in SMEs. (3) Among organizational factors, only "Commitment" influenced significantly on the sophistication level of e-commerce adoption in SMEs. This finding can help us to explain partly the argument is that given the same the level of organizational resources and operating environment, why several firms have implemented more sophisticatedly e-commerce innovations while others do not. (4) Perceived benefits of the technology had significant effects on a decision of initial adoption while perceived challenges did not effect on both the entry-level adoption as well as its extent of e-commerce in SMEs. (5) Finally, experience of the initial adoption of e-commerce in SMEs did not have any significant effect on a decision of subsequent sophistication of the technology. This finding helped us to explain partly an existing fact is that among adopters of e-commerce within the same operating environment, some firms have implemented e-commerce at the more sophisticated level while others do not. Due to the SMEs focus, the generalizability of our results is limited. The size of data was small with

113 respondents. The PLS approach can largely solve the problem; however, a larger sample size should be collected to test whether the results are replicable. The research instrument, although rigorously validated, has not been tested for test-retest reliability and external validity; further validation may be useful. Lastly, our study has examined both initial adoption and institutionalization of e-commerce. A majority of IS studies examines via the macro view of the adoption. Future research will benefit from focusing on institutionalization of e-commerce.

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Appendix A

| Constructs | Items | Sources |
|---|---|-----------------------------|
| Resources (Res) | <p>Res1: Employees in our enterprise have experience and exposure to information and communications technology and other skills (such as marketing, business strategy) to well support e-Commerce initiatives.</p> <p>Res2: Our enterprise has good business resource (such as the openness of organizational communication; IT-based oriented organizational culture, risk-taking behavior, open business relationships, IT-oriented business model and strategy, and available funding) to support e-commerce innovations.</p> <p>Res3: Our enterprise has strong technology resource (such as hardware, software, and their availability, flexibility, and performance) to support e-commerce innovations.</p> <p>Res4: Our enterprise has strong information resource (such as database, quality, liquidity, and accessibility of information) to support e-commerce innovations.</p> | [64]; [22]; [20] |
| Commitment (Comt) | <p>Comt1: Our enterprise has a clear-cut e-commerce Vision.</p> <p>Comt2: Our enterprise's senior management champions e-commerce initiatives and implementations.</p> <p>Comt3: Employees are e-commerce oriented and educated to understand and support the e-commerce strategy.</p> <p>Comt4: E-commerce implementations in our enterprise are strategy-led and focus on the alignment between e-commerce and business model and strategy.</p> <p>Comt5: Our organizational structure is flexible enough for changes management.</p> | [30; 37; 65] |
| Governance (Gov) | <p>Gov1: We have a specific IT steering committee to manage various aspects of business-IT fit.</p> <p>Gov2: Roles, responsibilities and accountability are clearly defined within each e-Commerce initiative.</p> <p>Gov3: We follow a systematic process for managing change issues as a result of e-Commerce implementations.</p> <p>Gov4: We have clearly defined metrics for assessing the impact of our e-Commerce initiatives.</p> | [22]; Author self-developed |
| Managers' IT Ability and Perception (MAP) | <p>MAP1: Our senior managers are good aware of all aspects of e-commerce in terms of benefits, challenges, and role.</p> <p>MAP2: Our senior managers are good aware of operating environment in terms of the business trends, barriers and supports in the domain of e-commerce in the operating environment.</p> <p>MAP3: Our senior managers have IT & changes management ability.</p> | [66; 67] |
| Managers' Leadership Style (MLS) | <p>MLS1: Our managers have a strategic-oriented leadership style; they envision a desirable future, articulate how it can be reached, set high standards of performance, and shows determination and confidence.</p> <p>MLS2: Our managers have an IT-oriented leadership style; they direct the business & employees become more innovative and creative.</p> <p>MLS3: Our senior managers have a risk-taking leadership style.</p> | [66; 67] |

| | | |
|--|---|-------------------------------------|
| Government Supports(GovS) | <p>GovS1: Government has a strong strategic commitment to general e-commerce across the nation with a comprehensive vision, clear-cut actions plans, and incentive policies.</p> <p>GovS2: Government has been effectively playing its pioneering role in facilitating the market demand for e-commerce through e-Government initiatives (e.g. public e-procurement, public websites); reengineering in state organizations is being undertaken; officials are well trained and have positive attitudes towards public e-services.</p> <p>GovS3: Government has been making many efforts to the development of e-commerce towards the national and international scope. E.g. bilateral and multi-parties agreements with international governments and organizations that related to legal issues, standards, security, etc. have been signed; supporting policies have been launched with an adequate attention on across industries, both large enterprises vs. SMEs, as well as rural vs. urban areas.</p> <p>GovS4: Supporting policies have been launched with an adequate attention on across industries, both large enterprises vs. SMEs, as well as rural vs. urban areas.</p> <p>GovS5: Legal and regulation infrastructure is well-defined to provide a motivated e-commerce environment via addressing traditional legal risks (e.g. corruption, bureaucracy, fraudulent, intellectual properties rights, etc.)</p> <p>GovS6: Legal and regulation infrastructure is well-defined to provide an incentive e-commerce environment through addressing e-transactions risks (e.g. software agents contracting, authentication, online security, privacy, etc.);</p> <p>GovS7: Legal and regulation infrastructure is well-defined to provide a transparent, fair e-commerce environment for both public vs. private enterprises and large vs. SMEs.</p> | [22]; [64]; Suggested by experts |
| Market Forces Supports (MFS) | <p>MFS 1: Our enterprise is operating in a dynamic environment with a strong trend of strong cooperation and collaboration, and spread within both domestic and international markets.</p> <p>MFS2: Our enterprise is active to integrate into both domestic and international markets.</p> <p>MFS3: Our enterprise's suppliers are supportive and allow conducting e-commerce activities.</p> <p>MFS4: Our enterprise's customers are supportive and allow conducting e-commerce activities.</p> <p>MFS5: Our enterprise's main competitors are supportive and allow conducting e-commerce activities.</p> <p>MFS6: Our enterprise's key competitors are using e-commerce or planning to adopt e-commerce in near future.</p> <p>MFS7: Our enterprise's business activities are strongly integrated within supply chain.</p> | [22]; [67]; [18; 30] |
| Related Industries Infrastructure Supports (RIS) | <p>RIS1: National financial system is improved and institutionalized enough to handle e-commerce activities.</p> <p>RIS2: Telecommunications system is improved and institutionalized well to support e-commerce activities.</p> <p>RIS3: Transportation system is improved and institutionalized well to support e-commerce activities.</p> <p>RIS4: Technology infrastructure is developed enough to support an incentive e-commerce environment. For example, IT applications and Internet is available and good enough to support well e-commerce activities in terms of interoperability, reliability, security, and standardization.</p> <p>RIS5: e-Government initiatives have been developing well (e.g. public e-communication, public e-certificate service,</p> | [22]; [37]; [64] |

| | | |
|---|--|-----------------------|
| | <p>e-tax, and public e-procurement).</p> <p>RIS6: Industrial information sources are available, transparency, and accessible equally.</p> <p>RIS7: Public administration institutions have established e-databases of economic and administration information; they are available and fair for enterprises.</p> | |
| Perceived Benefits (PB) | <p>PB1: E-commerce helps our enterprise to improve management issues.</p> <p>PB2: E-commerce helps our enterprise to improve competitive advantages.</p> <p>PB3: E-commerce helps our enterprise to improve its image within the operating environment.</p> | [30]; [15]; [54] |
| Perceived Risks (PR) | <p>PR1: Security issues in e-commerce are not a big deal to our enterprise.</p> <p>PR2: Standard issues in e-commerce are not a big deal to our enterprise.</p> <p>PR3: Cost issues related to developing, maintaining, and operating e-commerce is not a worry to our enterprise.</p> <p>PR4: Trust issue on e-commerce is not a big concern in our enterprise.</p> | [30]; [33] |
| E-commerce initial adoption (eCIA) (Reflec) | <p>eCIA1: Our enterprise has been implementing one or several e-commerce innovations separately for a small part of the total business transactions.</p> <p>eCIA2: Our enterprise has been using only the static or interactive websites to make promotions and publish basic company information or receive queries, e-mail, and form entry from users.</p> | Author self-developed |
| E-commerce Institutionalization (eCI) | <p>eCI1: Several e-commerce innovations have been implemented in our enterprise.</p> <p>eCI2: Most B2B business processes have been conducting electronically.</p> <p>eCI3: E-commerce innovations implemented have a good interoperability together, and with other existing IT systems.</p> <p>eCI4: E-commerce innovations implemented have a good interoperability with external IT infrastructure through transactive or integrated websites, and e-marketplace.</p> <p>eCI5: E-commerce innovations implemented are consistent with our business strategy, organizational structure, and social environment within our enterprise.</p> | Author self-developed |

Note: Manifest variables measured on a five-point Likert scale ranging from "Strongly Disagree" (value =1) to "Strongly Agree" (value =5).