

Factors Influencing Electronic Data Interchange Adoption among Small and Medium Enterprises in Saudi Arabia

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ABSTRACT

Manuscript type: Research paper.

Research aims: This paper aims to investigate what factors influence the intention of small and medium enterprises (SMEs) in Saudi Arabia to adopt the electronic data interchange (EDI).

Design/ Methodology/ Approach: A survey involving 269 SMEs in Saudi Arabia was conducted and data were analysed using multiple regression.

Research findings: Results demonstrate that perceived EDI benefits, organisational readiness, government support and pressure from business partners are significant determinants of the SMEs' intention to adopt the EDI in Saudi Arabia.

Theoretical contribution/ Originality: This study enriches the understanding on the issue of EDI adoption in an Arab country; it specifically fills the lack of academic research that concerns SMEs in Saudi Arabia.

Practitioner/ Policy implications: The insights gained from this study can facilitate industry practitioners to develop comprehensive business strategies and effective institutional policies to facilitate EDI implementation in Saudi Arabia.

Research limitation/ Implications: The findings of this study may, to some degree, be confounded by external validity since the sampling frame is restricted to SMEs located in Saudi Arabia only. Due to

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the size of the sample in the study, there is an imperative need for further research to be conducted with a larger sample size.

Keywords: Adoption, Electronic Data Interchange (EDI), Innovation, SMEs

JEL Classification: M15, M19

1. Introduction

The small and medium enterprises (SMEs) sector is, indeed, the key to unlock Saudi Arabia's economic potentials whereby the sector can promote economic growth and provide employment opportunities. As a part of the industrial sector, SMEs make a contribution of about 21 per cent (USD160,000,000) to the country's gross domestic product (GDP) and 53 per cent to the total employment of the country in 2016 (JEG, 2016). In addition, SMEs have a superior capacity to generate employment and contribute to the nation's economic growth. SMEs also have the advantage of being easily adaptable and flexible to the changing market conditions and opportunities since they can make better use of the scarce resources that are available through the limited capital provided (JEG, 2016). Despite the potentials of SMEs, it is observed that programmes, strategies and governmental policies in Saudi Arabia have, unduly, focused on large-scale enterprises, until recently. In several notable cases, discrimination against SMEs, primarily micro-scale enterprises, are also noted.

Majority of the SMEs in Saudi Arabia are family-owned although some are operated by professionals (Ahmad, 2012). In order for these SMEs to survive and flourish, they need to incorporate technology into their daily operations, particularly in today's world of globalisation. Although technology in developed countries have been in practice for more than two decades, technological adoption and information and communication technology penetration, among organisations in Saudi Arabia, have yet to reach a desired level (Rawashdeh, 2013). Nonetheless, the country has made a call for SMEs to adopt and utilise technology so as to enable them to be more flexible, responsive and dynamic towards changes made by globalisation.

Electronic data interchange (EDI) has been described by previous literature review (Anderson & Lanen, 2002; Iacovou, Benbasat, & Dexter, 1995; Leung & Law, 2013) as a technology that can potentially offer strategic benefits to its potential adopters. Information communi-

cations technology is one of the fastest growing industries, bearing with it, potentials for innovation and development. Information communications technology, hereby equivalent to EDI, can also bring about many advantages such as new job creations, GDP contributions, new industry development, workforce transformation as well as business innovations. With SMEs being the in-between of industries that are adaptable and flexible, there are many opportunities for growth and for making contributions to the country's economy. With smaller overheads and smaller capitals, SMEs stand to benefit from information communications technology.

However, despite the capability of the electronic means to reduce expensive and inefficient paper-based processes, many SMEs still hesitate to adopt technology. Swanson's (1994) taxonomy of Information System (IS) innovations suggested that EDI is considered as a Type 3 innovation because it involves technologies that would affect the core work processes of the host organisation. Swanson (1994) also contended that Type 3 innovations such as EDI are mostly adopted by larger organisations which have the capacity to process information in higher volumes, thereby allowing them to interact repeatedly with the outer environment. Consequently, this can create a greater diversity of jobs.

In comparison to big organisations, SMEs often avoid the adoption of Type 3 innovations such as EDI because they not only have low IT sophistication levels, they also lack the resources and this can be compounded by their weak market positions as well as their inadequate IT integration (Chau & Hui, 2001; Musawa & Wahab, 2012). Over the years, with information sharing that can be achieved through various IT applications, EDI has become an important resource powering global supply chain competitiveness. Of late, this phenomenon has become more acute. As SMEs are the major backbone of economies, they are also important contributors that can facilitate the transition to the market economy. However due to the low penetration of EDI among SMEs, many companies may be excluded from the global supply chain, thereby affecting the country's economy and capital market. Due to the importance that is attached to EDI and the contribution of SMEs, it is vital to investigate the key factors that could determine the intention of SMEs in Saudi Arabia to adopt EDI.

Many studies (Musawa & Wahab, 2012; Allagiannis, 2014; Iacovou et al., 1995) looking at EDI adoption have been conducted in developed as well as developing economies. One example is Musawa and Wahab

(2012) who focused on Nigeria and found that the slow adoption of EDI among Nigerian SMEs is due to the perceived excessive cost of implementation and the lack of supply chain partners' awareness on the EDI's benefits. Focusing on Greece as a case study, Allagiannis (2014) demonstrated that the low penetration of EDI among SMEs in Greece is due to perceived lack of benefits, higher financial cost and lack of technical competence. Allagiannis (2014) also highlights that industries and the government should put more pressure on SMEs so as to motivate them to adopt EDI. While these studies could provide some insights which can explain the lack of EDI adoption in those respective countries, a similar outcome may not be reflected in a country that has a different culture with a different system of business administration and government policies as well as values. For instance, research looking at SMEs intention to adopt and use EDI within the context of Saudi Arabia has not been explored, despite the fact that SMEs are considered as a diversification strategy that can expand the productive base of the Saudi economy (Kayed & Hassan, 2011).

As a response to the lack of literature, this study thus proposes to investigate the intention of SMEs in Saudi Arabia to adopt EDI since this technology has emerged in the world to become one of the growing technologies that is necessary and vital for promoting growth and economy. Moreover, scholars (Ngai & Gunasekaran, 2004) have also argued that the determinants of technology adoption should be based on the context of research since outcomes may be distinct from one context to another. Since the investigation of the SMEs' intention to adopt EDI may be different across countries throughout the world, outcomes drawn from previous studies such as Allagiannis (2014) and Kayed and Hassan (2011) can be used as a guideline to pave the way for a new research in another context. From the perspective of a Middle Eastern country such as Saudi Arabia, it is possible that a study of a similar nature may produce factors that had never before been uncovered, as SMEs prepare to face the challenges of using advanced technologies (Sawah, Tharwat, & Rasmy, 2008). For instance, EDI adoption may also be complicated by the different government regulations and management style (Faqeeh, 2010) or the work culture and environment which may impose pressure or a laidback attitude (Razi & Madani, 2013).

The remainder of this paper is organised as follows: Section 2 reviews the literature on EDI and factors influencing intention to adopt EDI as well as the hypotheses development. Section 3 describes the

research methodology while Sections 4 and 5 discuss the findings and results. Section 6 provides the implications of the study and concludes the paper.

2. Literature Review

2.1 Electronic Data Interchange (EDI)

Electronic data interchange is hereby also referred to as EDI. It is a cooperative inter-organisational system that allows business and trading partners to exchange structured business information between different computer applications via an electronic method (Swatman, Swatman, & Fowler, 1994; Rajaguru & Matanda, 2013; Lee, Ainin, Dezdar, & Mallasi, 2015; Jardini, Amri, & El Kyal, 2016). The inter-organisational system is a telecommunication-based computer system which is used by two or more organisations for the purpose of sharing data and applications among different organisational users (Barrett & Konsynski, 1982; Pruzinsky & Cash, 1990; Plomp & Batenburg, 2014). Scholars such as Engel, van der Aalst, Zapletal, Pichler, and Werthner (2012) and Pfeiffer (1992; 2012) stated that, for an inter-organisational system to become classified as an EDI, it should possess specific and essential features with a minimum of two organisations involved in a business relationship, as the users. Tasks such as data processing which pertain to transactions at both organisations should be assisted by an independent application system. These characteristics are unique to EDI because other inter-organisational systems are single system-based applications which can be utilised by several users at the same time. In addition, the data exchange integrity between the application systems of the trading partners must also be guaranteed. This is performed through a set of regulations and rules which also provide some kind of data coding agreements. Finally, the exchange of data between the application systems should be accomplished through the telecommunication links (Pfeiffer, 1992; 2012; Parasnis, 2015).

Through the years, there has been an intensity in globalisation, which not only causes world boundaries to be borderless, but also allows business transactions to be transacted with ease both locally and across the world. This has led to a more competitive business environment among business owners thereby, creating a need for the accurate and speedy transmission of information by the trading partners in the supply chains (WTO, 2014; Chen, Cheng, & Huang, 2013). In

a global environment, technologies such as EDI play a critical role in facilitating logistics operations (Werthmann, Brandwein, Ruthenbeck, Scholz-Reiter, & Freitag, 2016). Without EDI, the process of international logistics may consume a longer time and this may impede the exchange of trade and commerce. Thus, there is a critical need to improve the technology as soon as possible.

The implementation of EDI among countries continue to show its key business potentials as speed increases and as accuracy of information and business efficacy become more reliable. Consequently, the costs involved in its implementation have also dwindled. According to Reichert (2014), the number of international EDI transactions is greater than 20 billion per year and the number is still increasing. As trade expands, it appears that EDI has become a pertinent tool for SMEs that handle frequent transactions and in particular those who are also competing in the global market.

2.2 Overview of SMEs Businesses in Saudi Arabia

The definition of the term, small and medium enterprises (SMEs), varies across the Gulf countries and so its definition has not been conclusive. While there are various criteria used to define SMEs in the Gulf countries, the definition of SMEs in the context of Saudi Arabia, is commonly based on the number of employees. The Saudi Arabian General Investment Authority (SAGIA) has defined a small enterprise as one that employs between 25 and 59 employees, and medium-sized enterprises as those that employ between 60 and 90 employees. In the context of this study, the same definition is applied because the organisations being targeted in this study are the primary institutions which are responsible for managing the investment environment in Saudi Arabia. Hertog (2010) also argues that due to the scarcity of financial data in the Gulf, most public and private organisations base their definition of SMEs, solely on the number of employees.

Saudi Arabia is described as a factor-driven stage country, which is defined as a country that competes on its own endowment factors, primarily, unskilled labour and natural resources. While SMEs represent more than 93 per cent of the total business establishments in Saudi Arabia, the country's economy is dominated by large companies, mainly state owned, with many mainly involved in the production of energy and oil (Almoawi & Mahmood, 2011). Unlike the culture of most developed and developing nations, majority of the SMEs in Saudi

Arabia depend on the availability of the low-wage employment and the scarce financial support (Redwan, 2004) to create their business. The integration of Saudi Arabia into the World Trade Organization (WTO) in 2005, however requires SMEs to be equipped with more technical expertise than before. While intense international participation of SMEs require accurate and speedy information sharing, it has been noted that SMEs in Saudi Arabia are delaying the adoption of technology applications (Bahaddad, AlGhamdi, & Houghton, 2012; Almoawi & Mahmood, 2011). To encourage a more active participation among SMEs, the government of Saudi Arabia has initiated some national policies and framework that would support local SMEs' intention to adopt technology to develop and facilitate their businesses thereby, enabling these SMEs to attain their expected organisational performance as well as compete globally.

2.3 EDI Adoption Intention

A firm's intention to adopt EDI takes time to be processed during which a firm learns to become capable of transacting its business through EDI. Generally, this is done via a front-end and a PC-based EDI server. The process represents the first step of the technology diffusion (Rawashdeh, 2013). Previous studies on EDI (Cragg & King, 1996; Pfeiffer, 2012; Mehrmand, Nguyen, & Vakulenko, 2015) have used diffusion of the innovations theory (Rogers, 1983) to examine EDI adoption. However, much of these studies had given focus to looking at the perceived characteristics of EDI which would either inhibit or encourage EDI adoption.

Studies (e.g., Pfeiffer, 2012; Anderson & Lanen, 2002; Allagiannis, 2014) focusing on the perceived characteristics of EDI found that EDI characteristics that are likely to promote intention to adopt EDI include its relative advantage, trialability and compatibility. Relative advantage or perceived benefits is defined as the degree to which an innovation is perceived as being better than the idea it super-sedes; trialability refers to the degree to which an innovation may be experimented on a limited basis and compatibility is the degree to which an innovation is perceived as being in uniformity with the existing technologies and past experiences of potential adopters (Rogers, 2003). Of these three variables, perceived benefits of EDI were noted to be the most frequently identified factor for the adoption of technology-based

innovations among SMEs (Dey, Mohanty, & Tomar, 2016). Therefore, perceived benefits of EDI were included in this study's framework as one of the motivation factors for SMEs' intention to adopt EDI.

Various factors may also inhibit the intention to adopt EDI and past literature (Pfeiffer, 2012; Mehrmand et al., 2015) mentioned that complexity, cost of technology, the necessity to change, lack of system integration, and lack of technological skills, as the main inhibitors. According to Swatman et al. (1994), these inhibitors are expected to play a bigger role in the context of small organisations in which information technology (IT) sophistication and resources are limited. Likewise, Agwu and Murray (2015) also noted that the lack of technical skills and high financial costs are the most important factors that hinder the adoption of electronic technology among SMEs. Within the context of Saudi Arabia, Ahmad (2012) found that problems in obtaining financial support are commonly perceived as constraints by SMEs' owners. The inaccessibility to acquire capital for a start-up growth and the strict grant approvals also affect their operations. Nevertheless, SMEs in Saudi Arabia are also lacking in technological skills as well as their inability to employ skilled workers who can assist them with EDI adoption. Therefore, it is deduced that these two factors may also affect the Saudi Arabian SMEs' intention to adopt EDI. In this study, however, these two factors will be grouped under 'organisational readiness' and in the context of this study, it is defined as the availability of organisational resources (technological and financial). When compared to large organisations, SMEs tend to have limited resources and they may also experience more difficulties in obtaining external funding resources (Bonet, Armengot, & Martin, 2011). This imbalance has become a concern for SMEs when adopting new technology such as EDI (Ifinedo, 2011).

Since EDI is an inter-organisational system, its adoption would also be extended beyond the organisational boundaries. In this regard, much of its implementation would also depend on the institutional environment in which the organisation is situated rather than just the organisational and technological factors. In line with this argument, a few scholars (Bilgihan, Okumus, Nusair, & Bujisic, 2014; Zhang, Kandampully, & Bilgihan, 2015; Shen, Khalifa, & Lindsay, 2015) have also proposed that these factors be tested in a different environment. In Saudi Arabia, for instance, poor and inadequate technological infrastructure may dissuade firms from adopting any technological innovation hence, it is important to have these factors tested to see how

they affect the Saudi Arabian environment. Similarly, other studies (Swatman et al. 1994; Allagiannis, 2014; Eistert, 2013; Kreuzer, Krönung, & Bernius, 2014) have highlighted the importance of environmental factors such as trading partners' pressures and the government's pressure as pertinent influencers for EDI adoption. Therefore, these factors will also be considered in this study.

2.3 Research Model and Hypotheses Development

The research model (Figure 1) used in this study is adapted from Iacovou et al. (1995). An examination of prior empirical studies looking at EDI adoption reveals that Iacovou et al.'s (1995) model has incorporated many of the factors which were previously discussed to be significant predictors for technology adoption. However, deviating slightly from Iacovou et al.'s (1995) study model, the current study will investigate the intention to adopt EDI among SMEs in Saudi Arabia only. This is because the country is still experiencing a slow growth in organisational technology adoption such as EDI and e-commerce,

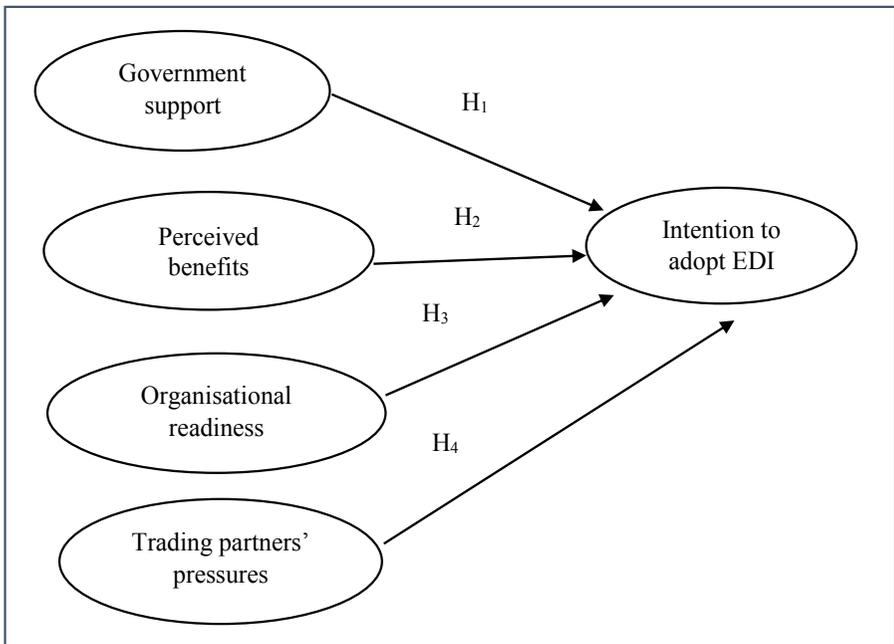


Figure 1: Intention to adopt the EDI Model

even though Saudi Arabia has the fastest growing ICT marketplaces in the Middle East (Al-Salamin & Al-Hammad, 2014). In addition, Davis, Bagozzi, & Warshaw (1989) and Seyal, Rahman, and Tajuddin (2002) observed that the intention of users will be able to predict the actual use of technology. Similarly, Sin, Chong, & Lin (2013) also highlighted that the measurement of behavioural intention is as good as actual adoption, especially when data about actual adoption is difficult to access. Therefore, this study will use SMEs' intention to adopt EDI as the dependent variable. Four factors namely, government support, perceived benefits, organisational readiness and trading partners' pressures are applied as factors which are likely to predict the intention of SMEs to adopt EDI, in the context of Saudi Arabia.

2.3.1 *Government Support (GS)*

Previous studies (Seyal, Rahman, & Mohammad, 2007; Pfeiffer, 2012) have noted the importance of government's support in EDI adoption. Since successful EDI implementation requires huge resources, which may be beyond an organisation's ability, the government needs to provide support through financial assistance and technological infrastructure. Both of these are perceived to be relevant and important in encouraging SMEs to adopt EDI. Moreover, the government's commitment in providing a positive and legitimate surrounding for technology development through digitising its economy, may also persuade SMEs to consider EDI as a solution for their business operations (Cousins, Goh, Elliott, Aubry, & Gilbert, 2014). Nonetheless, the SMEs' perception of the government's role towards technological innovations may also depend on the government's encouragement, initiatives and promotion of technology implementations. In view of this reality, it appears that the government may have to play a leading role if it is serious about diffusing technological innovations, including the adoption of EDI by SMEs.

Government support, nevertheless, may not be standard or uniform and researchers have highlighted that the impact of the government's direct intervention may vary between countries (Kettinger & Lee, 1994; Seyal & Rahman, 2005; Seyal et al., 2007). Sometimes, the government may mandate the adoption on companies by enacting regulations. For example, the Ministry of Commerce and Industry (MCI) in Saudi Arabia launched the "Qawaem", a new Extensible Business Reporting Language (XBRL) based on the electronic reporting platform, for

companies to submit their consolidated financial statements (Nitchman, 2015). Studies have also indicated that the Saudi Arabian government had acted as the chief funding source for their companies' technology infrastructure development since Saudi Arabia is a developing country with huge capital resources. The support of the Saudi Arabian government is evidenced through the various national e-government projects, which have been launched since 1998 (Al-Sobhi, Weerakkody, & El-Haddadeh, 2011). For example, the Saudi EDI system is a nationwide project that was founded by the public investment fund upon the royal decree approval. The intention of the Saudi Arabian government is clear, to support the implementation of the EDI. Based on the arguments, the following hypothesis is formulated:

H₁: Governmental support is positively associated with the intention to adopt EDI.

2.3.2 *Perceived Benefits*

Perceived benefits refer to the recognition of the level of relative advantages offered by EDI technology to an organisation (Musawa & Wahab, 2012). Several researchers and practitioners (Khazanachi, 2015; Musawa & Wahab, 2012) have attempted to identify the potential benefits of EDI technology. According to Pfeiffer (2012), the potential benefits offered by EDI are mostly related to its operational savings which are associated with the internal efficiency of the organisation. Other benefits are the opportunities EDI adoption may have on business relationships and transacting processes, which are mostly competitive and may offer tactical advantages.

Although the adoption of EDI by SMEs may impact huge financial savings, much attention has been focused on the impact of EDI on business operations (Musawa & Wahab, 2012). EDI adoption can result in organisational benefits when implementation is combined with the re-engineering process which may give rise to appropriate business strategies (Beatty & Jones, 2015). This implies that the potentials of EDI will be optimised if the technology is integrated with the core business of an organisation since higher levels of integration will lead to increased perceived advantages. According to Anderson and Lanen (2002), companies adopt EDI primarily to improve the efficiency of their accounting transactions. The characteristics of EDI, which is associated

with speedy order processing and less complexities, can also help to reduce order processing time, from the onset of sales order receipt to sales order scheduling. EDI also helps dealers to submit error-free orders to the companies (Cox & Ghoneim, 1996; Anderson & Lanen, 2002). Musawa and Wahab (2012) argue that SMEs who believe and trust the benefits of EDI are more likely to adopt it than others. Similarly, Anderson and Lanen (2002) also raise the possibility of SMEs who recognise the advantages of EDI are more likely to adopt EDI. Increased managerial understanding of the relative benefits of EDI also increases the possibility of allocation of managerial, technological and financial resources that are important for implementing an integrated EDI system. Based on these arguments, the following hypothesis is formulated:

H₂: Perceived benefits are positively related to the intention to adopt EDI.

2.3.3 *Organisational Readiness*

In line with Musawa and Wahab (2012), this study defines organisational readiness as the company's level of technological and financial resources. This factor is considered in this study because the sample consists of SMEs which are typically characterised as lacking in resources which are vital for EDI implementation (Leung & Law, 2013). Moreover, the comparatively low computerisation levels of SMEs business processing makes the integration of sophisticated information systems (e.g., EDI) difficult, with some even requiring financial support to spend on expensive expenditures (i.e., technology, employees and capital). Since small companies tend to be lacking in these resources, their ability to capitalise on all the strategic advantages of any specific technology may be limited.

In this study, organisational readiness is measured based on financial readiness and technological readiness. Financial readiness refers to the financial resources allocated for the adoption of EDI, which include payments for the installation charges, subsequent adoption of enhancements and the costs involved during usage. As integration is required for the success of EDI investments, the importance of financial resources is noteworthy (Musawa & Wahab, 2012). Usually, SMEs with greater financial resources are better equipped to implement the integrated EDI systems. Companies that can afford more integrated and

more costly EDI projects are more likely to enjoy an increased advantage of using such systems (Musawa & Wahab, 2012).

The second dimension of organisational readiness is technological readiness, which is concerned with the level of sophistication of IT usage and management in an organisation (Pare & Raymond, 1991). Usually, large companies are not likely to be intimidated by technology. This is because they tend to possess a superior view of corporate accounting data as an integral part of the overall management of information. They also tend to have access to the required technological resources, hence, they are more willing to adopt EDI. Moreover, companies with integrated computerised processes are better organised for undertaking EDI adoption projects.

While perceived benefits of EDI may motivate firms to adopt the technology, businesses are only willing to use them effectively when they are ready for it (Ali, Rahman, & Ismail, 2012). This is because technology implementation is associated with risks. From the perspective of SMEs, they may be reluctant to adopt EDI to support their accounting information system because they are not ready to face the potential risks posed by the technology. The lack of readiness thus arises based on certain organisation's lack of financial and technological resources (Abdinnour-Helm, Lengnick-Hall, & Lengnick-Hall, 2003; Ali et al., 2012). Owing to the scarce financial and technological resources, SMEs may take more time to consider adopting a new technology. Thus, researchers (Grandon & Pearson, 2004) conclude that organisational readiness can be a significant determinant for technology adoption. Therefore, based on these arguments, the following hypothesis is formulated:

H₃: Organisational readiness is positively related to the intention to adopt EDI.

2.3.4 Trading Partners' Pressure

Trading partners' pressure can arise from the notion of power and interdependency between companies. It is the competitive pressure exerted by one firm on another, based on various factors, to adopt EDI. As weaker partners in the inter-organisational relationship, SMEs are highly susceptible to pressures exerted by their stronger and larger trading partners (Lee et al., 2015). These impositions are especially prevalent in the case of EDI adoption because of the nature

of its network. It is not surprising that requests from potent trading partners for SMEs to become EDI-capable are expected to influence the adoption decision of the said SMEs, as compared to similar requests from lesser potent trading partners. Since more trading partners and competitors are becoming EDI-capable, SMEs are more inclined toward adopting EDI so as to remain competitive (Musawa & Wahab, 2012; Lee et al., 2015; Pfeiffer, 2012). Therefore, SMEs experiencing pressure from their trading partners will be more willing to adopt EDI as compared to SMEs who are not subjected to such pressure. SMEs are also more likely to conform to the accepted partners' view by adopting the EDI system because of their belief that they will be perceived to be technologically sophisticated by those partners whom they consider important to their company's future success (Musawa & Wahab, 2012). Thus, it can be expected that SMEs' intention to adopt EDI technology can be influenced by others' perspective, such as their trading partners' influence and pressure. Based on this argument, the following hypothesis is formulated:

H₄: Trading partners' pressure is positively related to the intention to adopt EDI.

3. Research Methodology

This study employed a survey method, using a questionnaire, to test the conceptual model and the hypotheses developed.

The measurement used in this study were adapted from prior literature. In an effort to reduce the measurement bias, multiple items were utilised to measure each construct in this study (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Table 1 illustrates the items used to measure the variables. Respondents were asked to answer the questions based on the 7-point Likert scale.

The questionnaire was pilot tested with 50 respondents from the SMEs. Based on the 42 responses highlighting the inconsistency of wording, unclear or ambiguous items in the questionnaire, the questionnaire was refined to be used for the larger study.

The samples for this study were selected from a list of 12,090 SMEs registered with the Ministry of Commerce and Investment, Saudi Arabia. Using the rand () function in MS Excel, random numbers were generated. We sorted the random numbers and selected the first of 500 companies as a sample for this study. The questionnaires

Table 1: Operational Definitions and Measurement Used

Variables	Operational definition	Items	Supporting literature
Government support	Refers to the governmental policies, interventions, initiatives and incentives.	Governmental policies provide support for faster EDI adoption. Governmental initiatives stimulate information supply that can provide support for faster EDI adoption. The electronic government initiatives provided by the government provide support for faster EDI adoption. The government's direct interventions provide support for faster EDI adoption. The economic incentives provided by the government provide support for faster EDI adoption.	Iacovou et al. (1995); Seyal and Rahim (2006)
Perceived benefits	Refers to improved operational performance in term of data accuracy, cost saving, business relationships and speedy application process.	EDI adoption improves operational performance in term of data accuracy. EDI adoption improves operational performance in term of cost saving. EDI adoption improves operational performance in term of business relationships. EDI adoption improves operational performance in term of speed up application process	Cox and Ghoneim (1996); Anderson and Lanen (2002); Pfeiffer (2012); Musawa and Wahab (2012)
Organisational readiness	Refers to the level of technological and financial resources of the company.	The necessary financial resources for implementing EDI systems are available. The financial resources support would be better equipped for implementing integrated EDI systems. The technological automated processes for implementing EDI systems are adapted. The technological automated processes for implementing EDI systems are integrated.	Iacovou et al. (1995); Seyal and Rahim (2006)

Table 1: (continued)

Variables	Operational definition	Items	Supporting literature
Trading partners' pressure	Refers to the degree that a SME may be pressurised by its trading partners to adopt a new innovation.	EDI adoption is requested by important business partners. EDI adoption is requested by majority of business partners. EDI adoption is recommended by important business partners. EDI adoption is recommended by majority of business partners.	Ifinedo (2011); Seyal and Rahim (2006); Lee et al. (2015)
Intention to adopt EDI	Refers to the person's belief that specific persons think he should or should not execute the behaviour.	My organisation intends to use (or continue the current EDI systems) EDI systems in the future. My organisation intends to use (or continue the current EDI systems) Web-enabled EDI in the future. My organisation plans to use EDI systems in the future. My organisation plans to use Web-enabled EDI in the future.	Davis et al. (1989); Rawashdeh (2013)

were distributed to the randomly selected 500 SMEs which were from different parts of Saudi Arabia. The cover letter enclosing the questionnaire stated that it should be completed by the Chief Operating Officer of the company. Of these 500 questionnaires, 269 were returned, resulting in 54 per cent response rate (Table 2).

4. Data Analysis

4.1 Respondent Profile

Table 2 summarises the demographic profiles of the companies surveyed. Of 269 respondents, 21 per cent have been in business for 16-20 years. This group formed the largest response category. In terms of employees, the number of employees varied: 18 per cent of the respondents have 25-35 employees and 9 per cent have more than 85 employees.

Table 2: Sample Information

Years of company's establishment			Number of employees		
	Freq.	%		Freq.	%
Less than 1 year	12	4	25-35	49	18
6-10 years	25	9	36-45	34	13
11-15 years	50	19	46-55	41	15
16-20 years	56	21	56-65	41	15
21-25 years	37	14	66-75	34	13
26-30 years	46	17	76-85	45	17
Over 30 years	43	16	Over 85	25	9
Total	269	100	Total	269	100

4.2 Measurement Validation

The variables used in this study were tested for construct validity using factor analysis. A Principal Component Analysis with Varimax Rotation was also carried out. Prior to performing this, the suitability of the data for factor analysis was assessed. The Kaiser-Meyer-Olkin (KMO) statistical analysis was used as an indicator. The results show that the KMO for the model is 0.84 with $p < 0.001$, indicating that factor analysis is appropriate to be conducted in this study (Kaiser, 1974). A set of 23 items was factor analysed. As highlighted in Table 3, all the items loaded significantly ($p < 0.001$) and are above the recommended value of 0.4 (Hair, Black, & Babin, 2010). Hence, all the items were used in this study. Five factors were identified – government support, organisational readiness, trading partners' pressure, perceived benefits and intention to adopt EDI.

The resulting scales were then assessed for reliability, using Cronbach's alpha. As shown in Table 4, all the scales have acceptable alpha values of over 0.6, which were above the minimum recommended value (Nunnally, 1978; Rawashdeh, 2015a). This implies that the items and scales used in this study are reliable.

One-tailed Pearson correlation was employed to assess the predictive validity of the variables. As shown in Table 5, all the independent variables are found to be significantly correlated with the dependent variable; and all the independent variables are not highly correlated with each other, indicating that the multicollinearity effect is not an issue in this study (Blunch, 2012; Rawashdeh, 2015b).

Table 3: Factor Analysis

Items	Components				
	Government support	Organisational readiness	Trading partners' pressures	Perceived benefits	Intention to adopt EDI
GS1	.755				
GS2	.735				
GS3	.737				
GS4	.885				
GS5	.878				
OR1		.777			
OR2		.735			
OR3		.641			
OR4		.730			
TP1			.804		
TP2			.792		
TP3			.786		
TP4			.778		
PB1				.842	
PB2				.748	
PB3				.768	
PB4				.769	
INT1					.823
INT2					.905
INT3					.791
INT4					.907
Eigenvalues					
Cumulative %					

Table 4: Cronbach's Coefficient Alpha

Variable	Cronbach's coefficient alpha	No. of items
Governmental support (GS)	0.877	5
Organisational readiness (OR)	0.716	4
Business partners pressure (BPI)	0.838	4
Perceived benefits (PB)	0.852	4
Intention to adopt EDI (INT)	0.956	4

Table 5: Intercorrelations among Variables

Factors	Organisational readiness	Trading partners pressure	Perceived benefits	Government support	Intention to adopt EDI
Organisational readiness	1				
Trading partners pressure	.217***	1			
Perceived benefits	.223***	.354***	1		
Government support	.240***	.205***	.289***	1	
Intention to adopt EDI	.299***	.419***	.541***	.397***	1
Mean	5.22	5.68	5.99	4.79	5.99
Std. Deviation	.35	.48	.64	.48	.86

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

4.3 Regression Analysis and Results

Multiple regression analysis was conducted to examine the hypotheses established in this study. Measures of government support, organisational readiness, perceived benefits and trading partners' pressure were entered as predictor variables for intention to adopt EDI (Table 6). In summary, these four predictors accounted for 41.5 per cent of the variance in intention to adopt EDI. This result suggests that the group of variables can be used to reliably predict the intention to adopt EDI.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.644a	.415	.406	.66326

Note: Predictors: (Constant), Organisational readiness, Trading partners pressure, Perceived benefits, Government support.

Table 7 illustrates that SMEs' intention to adopt EDI is significantly related to government support ($\beta=.216$; $p<0.001$), perceived benefits ($\beta=.377$; $p<0.001$), organisational readiness ($\beta=.116$; $p<0.05$) and trading partners' pressure ($\beta=.215$; $p<0.001$). Hence H_1 , H_2 , H_3 and H_4 are supported.

Table 7: Results of Regression Analysis

Independent Variables	Beta	T-values	P-values	Hypotheses	Results
Governmental support	.216	4.290	.000	H_1	Supported
Perceived benefits	.377	7.218	.000	H_2	Supported
Organisational readiness	.116	2.345	.020	H_3	Supported
Trading partners' pressures	.215	4.213	.000	H_4	Supported

Note: Dependent Variable: Intention to adopt EDI.

5. Discussion of the Findings

This study has determined the key issues that are related to SMEs' intention to adopt EDI in Saudi Arabia. The findings of this study reinforce the findings of previous empirical works (Chwelos, Benbasat, & Dexter, 2001; Ifinedo, 2011) where they found perceived benefits is one of the important predictors for SMEs' intention to adopt EDI. If the benefits are not viable, SMEs may not consider adopting the technology. Since SMEs are expected to pay more attention to the viable advantages of EDI, the perceived benefits of adopting EDI can be a determining motivator for SMEs to adopt the technological innovation.

The results of this study also clearly demonstrate that the government's support can also influence SMEs' intention to adopt EDI. The implication noted is that most of the SMEs in Saudi Arabia depend on the government to successfully adopt and sustain EDI technology. Although EDI has become prevalent in developed countries and economies, the technology is still considered to be in its infancy in Saudi Arabia. This lack of understanding of EDI by SMEs may be linked to the fact that the intention of SMEs in Saudi Arabia have been further hampered by the lack of financial support and loans from agencies and financial institutions (Ahmad, 2012). Therefore, mediating institutions such as the government is critical in fostering EDI adoption.

Further to that, pressure from trading partners also appear to be another factor that may influence SMEs' intention to adopt EDI. This finding is also consistent with the outcome noted by previous studies (Rawashdeh, 2013; Engel & Bose, 2014; Engel et al., 2012). Thus, dominant business partners can exercise their pressure on trading partners to embark on EDI technology. This outcome may also be related to the Arabic culture of power distance where the pressure of an important or influential other can make the lesser individual concede to the request. Consequently, such smaller or less influential SMEs may feel obliged to upgrade their technology adoption so as to be on the same level as their other more powerful trading partners, for the sake of having a continuous business relationship. Since EDI is considered as a collective innovation whereby the adoption would greatly depend on the collaborative and initiatives efforts of the potential adopters, the SMEs' decision to embrace the technology may very well rely on the pressures exerted by larger firms. By engaging in EDI technology, these SMEs feel that the technology can help them to outperform their rivals in the market. This result is supported by Apulu and Latham (2009) who argued that the correct usage of IT could assist SMEs in enhancing the core business processes thereby, enable them to reduce costs and provide a higher competitive advantage.

In this study, it is observed that the effect of organisational readiness on SMEs' intention to adopt EDI is not strong although the relationship is significant. One plausible reason for this is that Saudi Arabia is a developing country and its SMEs often depend on the public sector to foster and sustain their growth. The government's intervention in providing funding could therefore act as an impetus for small businesses to adopt EDI.

6. Implication of Research and Future Directions

In light of the relative dearth of research looking into EDI adoption among SMEs in Saudi Arabia, the findings drawn from this study could shed more light on the issue. There is additional evidence to support the premise that perceived technology benefits, organisational readiness, government support and trading partners' pressures are all important factors that can affect the intention of SMEs to adopt EDI. Therefore, the outcome also makes a contribution towards validating previous studies such as that of Iacavou et al. (1995) whose model was used to show EDI adoption in different contexts.

As a form of technology, EDI will continue to be a major technological standard for conducting business-to-business transactions or the B2B electronic commerce around the globe. The significant role of the perceived benefits implies that there is a need for SMEs to gain more knowledge on how EDI could be potentially used, so that benefits could be fully optimised for the benefit of improving business practices. Since EDI is a technology that is constantly evolving, it is important for SMEs to keep abreast with the development thus, they should consider building a network and seek advice from experienced businesses. Companies that have successfully implemented EDI could be used as mentors to provide support in facilitating the development as well as assist start-up companies to be better informed thereby, convincing them of the potential benefits of EDI.

The role of organisational resources and government support, undoubtedly, has a very important place in ensuring EDI adoption. Therefore, these agencies should provide more institutional interventions by involving other government agencies such as the Ministry of Commerce, various business support agencies and other industry associations. Their assistance and support can strengthen the ability of SMEs to invest in EDI. For instance, workshops, training and seminars can be organised as an effort to support a continuous educating force for such companies and their owners to upskill their community. This acquisition of knowledge is pertinent considering that ICT is still immature in the country. The government's policy of supporting such training programmes will certainly facilitate the upgrading and the maintaining of high-quality human resource pool for the EDI implementation. Notwithstanding this, policies and procedures for attaining credit facilities related to the technology adoption and implementation need to be more customer friendly by curtailing bureaucracy and increasing financial support.

Despite making a contribution to the relevant literature with regards to SMEs' intention to adopt EDI in Saudi Arabia, there are also some limitations in this study. The first of these is that the outcome is confined to one Middle Eastern country only hence, findings cannot be generalised to other Middle Eastern countries. A comparison needs to be done by conducting more research among other Middle Eastern countries if there is a need to understand the context of the Arab world. Secondly, although the sample size of the study is considered sufficient for the statistical analysis employed, a better statistical estimates may be reached with a larger sample size. Thirdly, the result

of this study implies that nearly half of the SMEs' surveyed, do not provide a clear explanation for their lack of intention to adopt EDI. Therefore, future studies should emphasise on additional variables so as to acquire a more comprehensive understanding of SMEs' technology adoption. Nevertheless, this study has attempted to provide a first-hand information and approximation that could enable one to better understand the factors that could influence SMEs intention to adopt EDI in Saudi Arabia. It is hoped that the insights gained from this study may facilitate industry practitioners to develop comprehensive business strategies and effective institutional policies to facilitate EDI implementation in Saudi Arabia.

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