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Research paper

Technological factors and e-commerce adoption among small medium enterprises in Kurdistan, Iraq

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Abstract

The adoption of e-commerce among SMEs plays an important role in the development of economy in a particular country. However, previous studies found the inconsistency results, especially between the developed and developing countries. Thus, there is the need for more studies to be conducted in order to get the insight of this research area. Therefore, the aim of this study is to identify the technological factors influencing the e-commerce adoption among SMEs in Kurdistan, Iraq. Data were collected among SMEs in Kurdistan area namely Erbil, Sulaymaniyah and Duhok. 200 SMEs participated in this study. The results exhibit that relative advantage and compatibility have significant influence to e-commerce adoption in Kurdistan, Iraq. The main contribution of this study is discussed at the end of the article.

Keywords: *Sustainability; Government Intervention; Relative Advantage; Compatibility; Complexity.*

1. Introduction

Organizations obtain substantial benefits from their investment in e-commerce technologies, though some literatures claimed that Small Medium Enterprises (SMEs) in developing countries do not obtain any benefits from e-Commerce technologies (Chee, Suhaimi, & Quan, 2016).In addition, despite e-business is likely to have a far-reaching implication for the international market, there is a lack of research which explored e-business growth in the Gulf region (Alrawi & Sabry, 2009). From a critical exposition of the literature, it is clear that empirical studies into e-commerce issues is still in infancy stage among Small Medium Enterprise in manufacturing in the developing countries, especially in the Arab states (Zaied, 2012).

Iraqi Ministry of Planning (IMP)(White, 2012) and National Investment Commission - Iraq NICI (NICI, 2014) reported that a slow adoption of technology among Iraqi SMEs contributes to less effective ways in conducting their business. Hence, the Iraqi government urges Iraqi SMEs to leverage on the Internet , in order to gain their competitive advantages and improve their business operations (UNIDO, 2015; White, 2012). In a report published by the Iraqi Ministry of Planning in 2016, 80% of SMEs had Internet connection but had not adopted the e-commerce (IMP, 2015). The technology context for the adoption of technology by the SMEs in Iraq highlights the different technological aspects that influence the adoption. The technological elements like the relative advantage that the firm will benefit through the adoption, compatibility, and complexity of the relevant technology to their existing business mechanisms is likely to influence the adoption process (Rogers, 2003; Rogers & Kim, 1985). As limited research were conducted on these factors in Iraq, it is very important to shed lights on the phenomenom to help boost its economy. Therefore, this paper aims to examine the technological factors that may influence e-commerce adoption in Iraq SMEs from the perspectives of managers or owners of these organizations.

2. Literature review

Many scholars used Diffusion of Innovations (DOI) Theory in order to explain diffusion and adoption of technology. The theory which was proposed by Rogers (Rogers & Kim, 1985), is also used as an explanatory framework (Pinfield & Middleton, 2016) with an ability to explain the e-commerce decision(Jamali, Marthandan, Khazaei, Samadi, & Fie, 2015). As deliberated by Ruivo, Rodrigues, Johansson, Oliveira, and Rebelo (2016), the theory has the potential to provide a more favorable framework that covers the IT adoption processes of SMEs, reflecting the SMEs heterogeneity.

Technological context represents the internal and external technologies related to the organization. In includes the technologies which are already being utilized by the firm, along with those that exist in the marketplace but not currently in use (Baker, 2012). Three variables are proposed in this category namely relative advantage (or perceived benefits), compatibility and complexity. These three dimensions are equivalent with DOI theory of determinants of innovation.

Rogers (2003) defines relative advantage as the degree to which an innovation is perceived as better than the idea it supersedes as the potential adopters will perform an explicit or implicit cost benefit analysis. There was a diverse result pertaining to relative advantage on adoption among SMEs in developed, and developing countries including the Arab countries (Ahmad, Abu Bakar, Faziharudean, & Mohamad Zaki, 2014; Chee et al., 2016). Several researchers attempted to interpret these unexpected results by suggesting a theoretical suggestion without empirical evidence. Hence, there is a need to investigate on this issue.

Similarly, compatibility and the complexity of technology have also shown mixed results in different context. (Ahmad et al., 2014;

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Jahongir & Shin, 2014; Venkatesh & Bala, 2012). Furthermore, high degree of compatibility able to decrease the perception of risk and increase the perception of benefit (Gao, Leichter, & Wei, 2012). Gao et al. (2012), and van Rijnsoever, van Hameren, Walraven, and van Dijk (2009) examine the interaction effect among innovation characteristics. They found that Compatibility has a significant positive effect not only on adoption decision but also on perceived Relative Advantage, perceived risk, and perceived complexity. Hameed, Counsell, and Swift (2012) have however argued on inconsistent relationship between compatibility and adoption. Thus, it has to be investigated further.

Even though the previous study have highlighted complexity as an important variable in the adoption of technology (Venkatesh & Bala, 2012) study among Canadian, Malaysian and Saudi SMEs does not recognize complexity as a factor that influences the adoption of e-commerce (Ahmad et al., 2014; Chee et al., 2016). Accordingly, this study will use complexity as another variable in the adoption of e-commerce among Iraqi SMEs.

Many studies have revealed that the underused of technology among SMEs is due to a series of restrictions on the technological context. Previous scholars found that relative advantage, compatibility, and complexity, are important variables that influence the adoption of e-commerce (Ahmad et al., 2014; Chee et al., 2016).

3. Research methodology

The data were collected from Iraqi SMEs in three cities of Kurdistan, Iraq. A stratified random sampling approach was used to select participants for this study. As the unit of analysis of this study was the organization level, the respondents included were the owner or manager and chief executive in the top management of SMEs. They are largely responsible for the decisions on the adoption of technology and those who have the authority to make the final decision on the adoption e-commerce.

All items were modified from extant literatures and were adapted to meet the purpose of this study. The items were measured using a 6-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (6). There was 6 items under Relative Advantage which were improved from Al-Somali, Roya, and Ben (2015). Compatibility with 7-item were modified from Premkumar and Roberts (1999). Complexity (5-item) and e-commerce adoption (5-item) were adapted from Premkumar and Roberts (1999), Wu, Mahajan, and Balasubramanian (2003). A set of questionnaire were sent to around 600 SMEs. From that numbers, a total of 224 questionnaires were returned, however only 200 questionnaires were qualified for further analysis. Table 1 shows the participants' demographics.

Table 1: Profile of Respondents (N= 200)

Description	Percent
Gender	
Male	89.0
Female	11.0
Age	
18-29	10.5
30-39	55.5
40-49	30.0
50-60+	4.0
Education Level	
High School	5.0
Diploma	26.0
Degree	64.5
Master	4.5
Owner Tenure (Year)	
Less than one	1.0
1-5	14.0
6-10	61.0
11-15	21.0
More than 15	3.0
Organization Location	
Erbil	61.0
Sulaymaniyah	25.5
Duhok	13.5

The data shows, most of respondents (89%) are male, aged between 30-39 (5.5%) , has been in the company between 6-10 years (61%) , and most of the firms (61%) are located in Erbil.

4. Findings and discussion

In order to achieve the objectives of this study, the structural equation model (SEM) with PLS method was used for data analysis, using the assessment of structural and measurement model. In asessment of measurement model, the convergent validity test is performed. This includes indicator loadings, composite reliability (CR), and average variance extracted (AVE). Based on the results provided in Table 2, all items for indicators loading exceed the recommended value of 0.7 (Hair Jr, Ringle, & Sarstedt, 2011). Except for one item, which is factor loading (COMT4), valued at 0.325 and was deleted due to the impact factor that is low loading. Furthermore, AVE is ranging from of 0.796 and 0.978, higher than 0.50, and the CR was reported in the range of 0.95 to 0.99, higher than 0.7 as suggested by Hair (Hair, 2007).

Table 2: Descriptive Analysis and Sources of Measurements

Relative Advantage		0.96	0.796	Yes
RAdv1	0.893			
RAdv2	0.902			
RAdv3	0.905			
RAdv4	0.901			
RAdv5	0.884			
RAdv6	0.869			
Compatibility		0.96	0.818	Yes
COMT1	0.955			
COMT2	0.956			
COMT3	0.941			
COMT5	0.727			
COMT6	0.917			
COMT7	0.910			
Complexity		0.99	0.978	Yes
COMX1	0.986			
COMX2	0.990			
COMX3	0.992			
COMX4	0.989			
COMX5	0.988			
e-Commerce Adoption		0.95	0.809	Yes
EC1	0.880			
EC2	0.951			
EC3	0.948			
EC4	0.924			
EC5	0.785			

After confirming the convergent validity, the model is tested with the discriminant validity. Discriminat validity was assessed through the examination of the correlations between variables, where values that represents by each variables must not overlapped with each other (Fornell & Larcker, 1981). As shown in Table 3, the square root of AVE of all constructs, presented in the diagonal values is larger than other cross-correlations. The presentation of this information though Fornell-Lacker criterion, suggesting that this model has achieve its discriminant validity. As the measurement model shows an adequate validities (convergence and discriminat), it is eligible for further analysis.

Table 3: Discriminant Validity

Indicators	1	2	3	4
Relative advantage	0.818			
Compatibility	-0.133	0.978		
Complexity	0.557	-0.145	0.796	
e-Commerce Adoption	0.307	-0.059	0.380	0.800

*The diagonals values represents the square root of AVEs

Next assessment of structural model was conducted. Structural model presents relationships between independent variable

(exogenous construct) and dependent variables (endogenous construct), based on the determination of coefficients: beta values (β) and the R^2 (Hair Jr et al., 2011). The β value indicates the strength of the relationship between variables; the R^2 value shows the percentage of variance in the model that indicates the predictive power. By the bootstrapping (resampling = 500) method, the path significance levels (t-values) are estimated. The results of the current study show that R^2 value for e-commerce adoption intention is 0.158 implies that 15.8% of the variance in e-commerce adoption is explained by technological factors. Table 4 exhibits, the hypotheses tested for this study. The results demonstrated that the relative advantage, and compatibility has a positive relationship with e-commerce intention with $\beta = 0.139$, $p < 0.1$ and $\beta = 0.304$, $p < 0.01$, respectively. However, there not enough evidence to accept the relationship between complexity and technology adoption.

Table 4: The Hypotheses Result for This Study

Hypo.	Path	β	t-Value	Decision
H1	Relative Advantage → e-Commerce Adoption	0.304	3.583**	Supported
H2	Compatibility→ e-Commerce Adoption	0.139	1.670*	Supported
H3	Complexity→ e-Commerce Adoption	0.003	0.048	Not Supported

Significant at * $p < 0.1$ ** $p < 0.05$

Then, a predictive sample Stone-Geyser's (Q2) technique, was applied to calculate predictive relevance. Since the author used the blindfolding procedure, this model must have the Q2 values more than 0 (Henseler & Chin, 2010). As the predictive relevance, the Q2 of e-commerce adoption is 0.114, suggesting that this model shows a good predictive relevance.

This study intends to examine the potential technological factors that influencing SMEs the e-commerce adoption intention among Iraqi SMEs in Kurdistan area. The finding exhibits that relative advantage and compatibility are two important determinants of technological factor that influence the adoption of this technology. As posited, relative advantage has significant influence on e-commerce adoption among Iraqi SMEs such as other studies as well (Ahmad et al., 2014; Sin et al., 2016). This result is consistent with Seyal and Rahman (2003), they suggest that the effect of Relative Advantage still has a strong influence on adoption decision but its influence depends mainly on the prior awareness about characteristics of technology and its capability. Hence, this result suggests that SMEs in the region are generally positively encouraged to adopt e-commerce upon realizing that adopting this technology may provide benefits to their business.

The result demonstrated that the compatibility has significant influence to the intention adoption of e-commerce (Hung, Yang, Yang, & Chuang, 2011; Venkatesh & Bala, 2012) but not affected the complexity (Ahmad et al., 2014). This result is in line with prior researchers (Ahmad et al., 2014; Picoto, Bélanger, & Palmados-Reis, 2014) who conducted studies of e-commerce adoption among SMEs. This may be construed as evidence in proving that Iraqi SMEs are more concerned with the compatibility of e-commerce system and existing system rather than the complexity of e-commerce.

The results of the data analysis indicated that perceived complexity, is found to have a insignificant relationship with firms' intention to adopt e-commerce.

5. Conclusion

This study examines the relationship between technological factors such as relative advantage, compatibility and complexity with ecommerce adoption among Iraqis SMEs. The findings of the current study suggest the significant relationship between relative advantage and compatibility with e-commerce adoption. Thus, the study recommends that the owners and managers of SMEs in Iraq to realize that modern technology and the trend towards the adoption of e-commerce enables firms to be effective and efficient. Additionally, there is a need to expose the firms, its owners and managers to the advantages of e-commerce as a tool in enabling business success. Though the environment in Iraq is uncertain with long civil conflict issues, technology adoption is considered critical for achieving better business positioning. Entrepreneurship program and technology to facilitate businesses are seen as a great move to achieve this objective. Managers or owners of SMEs need to know the benefits provided by e-commerce in the event of its adoption in their firms. From this perspective, government agencies in Iraq, should take appropriate measures to improve training programs for achieving a sustainable environment for businesses to thrive.

Another contribution of this study is it encourages the policy-makers in the Iraqi government to notify small and medium enterprises on the acquired competitive advantage of e-commerce adoption and development of new programs. They should also be supported financially, and provided with better infrastructure. This model of research is able to serve as a guideline for future researchers, particularly in Iraq, as well as other Arab countries. Researchers can duplicate this study in the context of other countries in the Middle East, especially those suffering from civil conflict, and compare the result and verify the impact of civil conflicts. Also, the recommendation for future studies is to add another variables of organizational and environmental variables related to the adoption of e-commerce.

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