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APPLYING THE ENVIRONMENTAL CONTEXT OF T-O-E FRAMEWORK TO EXAMINE THE EFFECTS OF ENVIRONMENTAL FACTORS ON ADOPTION PRACTICE OF ICT IN PAKISTANI GARMENT SECTOR SMES - A CASE STUDY OF DISTRICT OF FAISALABAD, PAKISTAN

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Abstract

Based on the environmental context of the T-O-E framework, this study proposed to find out how environmental factors (competitive pressure, government role, availability of external expertise and industry type) affected the adoption practice of ICT in garment sector SMEs, in the District of Faisalabad, Pakistan. Emphasizing the environmental context of TOE framework, data were collected from owners/managers/executives of 269 SMEs, through survey questionnaire. Structure Equation Modeling (SEM), with smartPLS, was used for the data analysis. Findings indicated that all environmental factors significantly affected the SMEs, decision to adopt and use ICTs. The proposed model will be helpful to SMEs in Pakistan, in making investment decision regarding adoption of ICT, which, in turn, would enhance their performance and increase their capabilities to survive in the competitive market place.

Keywords: T-O-E Framework, ICTs, SMEs, Adoption Practice, Environmental Factors

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1. Introduction

Use of computers and information technology could enable top management, to keep financial records accurately, follow efficiently the manufacturing processes, summarize the data and help in the managerial decision-making (Glov and Akridge, 2000). New and advanced information and communication technologies can help the organizations, to generate, evaluate, process, communicate, collect, recover, sort, store and transform the important data. Oliner and Sichel (2000); Jorgenson and Stiroh (2000) stated that using computers and related technologies, significantly affected productivity of the organizations. According to Barba-Sánchez, et al (2007), excessive use of new and advanced information technologies affected the working behavior of people and firms. Talukder, et al (2008) argued that organizational performance could significantly be improved while using these technologies. Koellinger, (2008); Brynjolfsson and Hitt, (2000) revealed that with the effective utilization of computers and related technologies, organizational productivity could be increased at national and global level. It was found by Talukder, et al (2013)that all the technologies like telephone, fax, printers, PC, internet, soft applications, world wide web, bar code reading machines and email, can be termed as ICT.

Laudon and Traver (2011) opined that internet enables organizations to exchange the expertise and information with each other in effective and efficient manner. Particularly for small scale firms, internet provides a number of opportunities such as assessing new markets, publishing their products within a short span of time and at low cast, advancing their organizations, introducing new products on a large scale and using different sources of information for building new relationships with their counter parts. There are positive and negative consequences of international trade,

especially for small scale firms in developing countries. In this regard, it is important to examine those critical factors, which persuaded SMEs to adopt ICTs and its impact on their productivity. As argued by **Talukder et al.**, (2008), these new and advanced technologies significantly impacted the productivity of firms.

2. Review of Literature

Technology Organization and Environment (TOE) framework was developed by **Tornatzky** and Fleischer (1990). This model is also widely used in a number of industries like health care (Lee), manufacturing, and retail, wholesale and financial sector (Zhu et al. 2006). It is interesting to note that to test the TOE framework, empirical study was used with different sets of factors, in the technological, organizational and environmental context. Many researchers agreed with Tornatzky and Fleischer (1990) that these three played a vital role in ICT adoption but there could be unique and different sets of factors, for each context. This study used environmental context of the framework, which included four crucial factors that influenced the SMEs, to adopt ICT. These are competitive pressure, government's role, availability of external expertise and industry type. Competitive pressure means competition with rivals in the market for market share and survival (Nguyen, 2009). Earlier studies indicated that small businesses were susceptible to client pressure. Due to rising demand from China, there is need to improve efficiency in business operations, and hence smaller firms opt for IT technologies (Nguyen, 2009; Blomquist and Wilson, 2007). De Burca, et al (2005) found that pressure from customers and suppliers was considered the most influential factor, which persuades small businesses to adopt and use new IT technologies. These finding are consistent with the findings of Mole et al. (2004), who stated that client, rivals and supplier pressure were important determinants of IT innovation adoption.

A study conducted in Singapore, by Thong (1999), revealed that the government significantly facilitated and supported SMEs, in public and private sectors, to adopt new ICT innovation. Bozeman (2000 argued that the role of government, in the adoption of new IT innovation, has become an attractive area for research and it draws the attention of academia. Fujisue (1998); Crow and Nath (1990, 1992) also reiterated that transfer of new innovation is now the responsibility of the government. Kamath and Liker (1998) maintained that leader in the value chain can persuade the other value chain partner to innovate. Tornatzky and Fleischer (1990) found that with respect to industry life cycle, those firms working in highly growing industries are inclined to be more innovative. On the other hand, adopting innovation by firms, working in the declining industries is not clear. In the declining industries, some firms innovate by taking efficient initiatives or through investing into new business while other firms do not invest in technological innovation in order to avoid the costs. However, pragmatic work is needed to explore the link between innovation adoption and industry life cycle.

3. Statement of the Problem

Though both government and academics motivate SMEs to adopt ICT innovations, very limited research has been carried out to investigate the adoption of ICT innovations by SMEs in developing countries (Kula and Tatoglu, 2003; Berry, et al, 2001; Kartiwi, 2006). In Pakistani context, SMEs sector plays a significant role in helping the country's economy and improving the economic and social sphere. The process of economic growth of developing countries, can be accelerated by the adoption of ICT innovations, which make both direct and indirect contributions. However, the rate of adoption and utilization of IT, by SMEs in Pakistan, is slow but it is increasing with the

passage of time as more and more SMEs are realizing the importance of ICTs (Irfan, et al, 2010).

4. Need of the Study

As there is scarcity of empirical work, on adoption of ICT by SMEs in the developing world, particularly in Pakistan, an empirical research was required to understand the adoption practice of ICT, by SMEs in Pakistan, with the focus on factors that hindered the adoption process. This study used the environmental context of TOE framework, to examine the effects of environmental factors, on ICT adoption, among garment sector SMEs in Pakistan.

5. Objectives of the Study

The objectives of the study are as follows:

- a) To understand the adoption practice of information and communication technologies, among small and medium size enterprises, in Pakistan.
- b) To analyze the effects of environmental factors, on adoption practice of ICTs, among Pakistan SMEs.

6. Hypotheses of the Study

NH-1: There is no significant relationship between competitive pressure and adoption of ICT in Pakistani SMEs of garment sector.

NH-2: There is no significant relationship between Government role and adoption of ICT in Pakistani SMEs of garment sector.

NH-3: There is no significant relationship between external expertise availability and ICT adoption in Pakistani SMEs.

NH-4: There is no significant relationship between industry type and ICT adoption in Pakistan SMEs.

7. Research Methodology

7.1 Sample Selection

This study used survey research design. The population consisted of SMEs in garment sectors that were registered with Faisalabad Chamber of Commerce and Industry. Total registered SMEs were 3537, out of which 673 were in garment sector. The list of these SMEs with the complete address, was available on the official website of the Chamber.

7.2 Source of Data

Detailed and structured questionnaire was administered for data collection. Questionnaire was divided into two parts. First consisted of close-ended questions, which were about the demographic characteristics of the respondents. Second part of the questionnaire focused on the environmental factors influencing the adoption practices of ICT. The questionnaire was administered through conventional postal service, with a return envelope. After 15 days, reminder was given through mobile call and text massage. To ensure the maximum response rate, 600 questionnaires were distributed. 317 questionnaires were returned out which 48 were incomplete. Remaining 269 were considered for the analysis.

7.3 Period of the Study

All these activities were recorded during the period June and July 2018.

7.4. Tools used for the Study

This study used 5-point Likert Scale, to investigate the effects of environmental factors on adoption practices of ICT, among garment sector SMEs in the District of Faisalabad, Pakistan. Dawes (2008) found that higher mean of the variables could be produced by the usage of a 5-point Likert scale. The questionnaire was pilot tested, items per construct. Four instruments for government policy were adopted from Beal and Abdullah (2002). Four instruments for competitive pressure were adopted from Lera-Bayo-Moriones López (2007).

8. Analysis of Data

The purpose of this study was to examine the effect of environmental factors on adoption

practices of ICT, in the garment sector SMEs of the District of Faisalabad, Pakistan. The study used surrey approach for collecting data through questionnaire. IBM SPSS statistics v.23 and smartPLS v 2.0 were employed for the data analysis.

8.1 Model Evaluation

This study used Partial Least Square (PLS) and structural equation modeling PLS-SEM to measure the overall goodness of the model and testing of hypotheses was done by using SmartPLS software v.2.0. (Figure-1).

8.2 Evaluation of Measurement Model

Table-1 displays the values of Cronbachs alpha, composite reliability and average variance extracted (AVE), for all constructs. The composite reliability values of the corresponding variables like competitive pressure, government role, ability of external expertise, industry type and adoption practice, were 0.825, 0.8142, 0.848, 0.0.870 and 0.843 repectively (Table-1). The Cronbach Alpha values of the corresponding variables like competitive pressure, government role, ability of external expertise, and industry type were, 0.721, 0.0.696, 0.764, 0.775 and 0.767 respectively (Table-1). The average variance extracted values of the corresponding variables like competitive pressure, government role, ability of external expertise, and industry type, were 0.545, 0.528, 0.584, 0.690 and 0.518 respectively (Table-1).

To confirm the validity and reliability, this study followed the rule of thumb, proposed by **Esposito Vinzi** and **Russolillo (2010). Table-2** depicts the values of Cronbachs alpha, composite reliability and average variance extracted (AVE), for all constructs. According to **Fornel** and **Larcker (1981); Hair et al (2014),** the composite reliability should be accepted at 0.70 and AVE should be at 0.50. As shown in the **Table-2**, all the constructs recorded high reliability and their average variance extracted

(AVE) was greater than the cut off point of 0.50, which was indication of reliability of the measurement model. This study calculated Cronbachs Alpha to find out internal consistency of the data. **George** and **Mallery (2003)** provided the rules for deciding the value of alpha; " $\alpha > 0.9$ -Excellent, $\alpha < 0.8$ -Good, $\alpha < 0.7$ -Acceptable.

To observe discriminant validity, this study conducted discriminant validity to guarantee the external consistency of the model, based on the comparison between the latent variables, as shown in **Table-3**, where the AVE of variables were shown as: Availability of external expertise (AEE)= 0.76433; Competitive pressure (CP)=0.720257, Government's role (GR)= 0.73881; Industry type (INDTP)= 0.726836 and ICT adoption practice (AP)= 0.83118

8.3. Evaluation of Structural Model

This part of the study treats the structural model, after the evaluation of measurement model, as pointed out by Hair et al., (2006). Structure model deals with the dependence of the relationship in the hypothesized model of the study. In PLS, structure model gives inner modeling analysis of the direct relationship among the constructs of the study and their tvalues reveal path coefficients. As argued by Agarwal and Karahanna (2000), the path coefficients were the same as the standardized beta coefficient and regression analysis. Beta values of the coefficient of the regression and t-values were examined, to decide on the significance. Following the rule of thumb Hair et al (2014), t-value greater than 1.64 was considered to be significant. This led to decisions on the proposed hypothesis. The basic purpose of this study was to focus on model evaluation, with examination of direct relationships, and secondly, to test the hypothesized relationships, among the constructs, through structural model.

First hypothesis (NH-1) states that there is significant relationship between competitive pressure and adoption practice of ICTs, in SMEs (t=6.153, p < 0.05). This finding was consistent with and supported by earlier findings such as Mole et al. (2004); Lera- Bayo-Moriones López (2007). Hence NH-1 (There is no significant relationship between Competitive pressure and adoption of ICTs in Pakistani SMEs of garment sector) was rejected. In other words, SMEs considered ICTs to be useful and helpful in tough and competitive business environment, and adopted ICTs. There was significant relationship between government's role and adoption practice of ICTs in SMEs (t=2.203168, p <0.05). Hence **NH-2** (There is no significant relationship between Government role and adoption of ICTs in Pakistani SMEs of garment sector), was rejected as this hypothesis was supported by the prior studies such as Bozeman (2000); Djatikusumo et al (2012), which indicated that government can play a significant role, by formulating supportive policies, creating flexible environment and providing expertise and financial aid to SMEs, to adopt ICTs. Availability of external expertise did have a significant relationship with adoption practice of ICT. Hence NH-3 (There is no significant relationship between external expertise availability and ICT adoption in Pakistani SMEs), was rejected. It means that if SMEs were assured that experts/professionals/ consultants regarding ICTs were available in the market, they would adopt ICTs. There was significant relationship between industry type and adoption practice of ICTs (t=4.280806, p=0.05). Hence, NH-4 (There is no significant relationship between industry type and ICT adoption in Pakistan SMEs), was rejected. In other words, SMEs, which belong to a complex, competitive and technology demanded sector, will be more willing to adopt ICT.

9. Findings of the Study

This study found that all constructs recorded Cronbachs Alpha values at more than 0.6. This indicated that all the variables in the study enjoyed good consistency. According to the rule of thumb, outer loadings should be 0.5 and above. In this study, it was found that there was direct relationship between environmental factors and adoption practice of ICTs among Pakistan SMEs.

10. Suggestions

This study collected data from the District of Faisalabad in Pakistan and SMEs were selected only from garment sector. Thus findings of this study cannot be generalized and future research is needed to take data from other parts of the country as well as from SMEs other than garment sector. The rate of adopting ICT in SMEs was relatively low in Pakistan and therefore, further research is needed to identify additional factors that facilitate adoption of ICT. Searching for additional variables, that will improve our ability to understand and predict adoption practice of ICT more accurately, is essential.

11. Conclusion

Findings of this research suggest that SME, in Pakistan should adopt and use information and communication technologies, in order to enhance their productivity and survive in the highly competitive market place. By adopting ICT, SMEs can get multiple advantages like expending business from local level to national and global level, manage their business activities effectively and efficiently identifying new markets, reducing the operational cost and gaining competitive edge over their competitors. As business environment of today is complex and ever changing, adopting new technologies helps the managers of SMEs in quickly taking rational decisions.

12. Limitations of the Study

This research was cross-sectional that measured effects of environmental factors on adoption practice of ICTs in Pakistani garment sector SMEs. This was a limitation of the study because cross-sectional is quite vague in proving a cause- effect relationship.

13. Scope for Further Research

This study was quantitative in nature, and it relied on questionnaire for gathering data. There could be a qualitative or mixed-mode approach, on consumer resistance to innovation, in the context of Pakistan.

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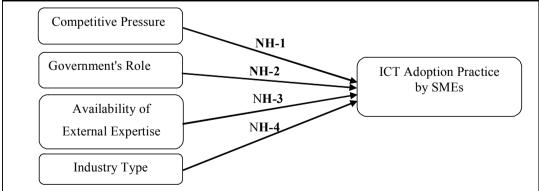


Figure-1: Proposed Resaerch Framework

Sources: Proposed Research Framework (2018) from Existing Literature

Table-1: Convergent Validity

Constructs	Items	Loadings	Cronbachs	Composite	AVE
			Alpha	Reliability	
Availability of	AEE1	0.824291	0.764035	0.848122	0.584272
External Expertise					
	AEE2	0.801513			
	AEE3	0.760137			
	AEE4	0.661363			
Adoption Practice	AP1	0.771105	0.76739	0.843029	0.518778
	AP2	0.725728			
	AP3	0.643265			
	AP4	0.747512			
	AP5	0.707137			
Competitive Pressure	CP1	0.81344	0.721156	0.825258	0.545846
	CP2	0.818281			
	CP3	0.721378			
	CP4	0.575959			
Government Role	GP1	0.837276	0.696893	0.814243	0.528292
	GP2	0.797189			
	GP3	0.675806			
	GP4	0.565607			
Industry Type	INDTP1	0.836401	0.775571	0.870055	0.69086
	INDTP2	0.864186			
	INDTP3	0.791325			

Sources: Primary Data (2018) using smart PLS (Version 2.0)

Table-2: Latent variable Correlation

	AEE	CP	GP	INDTP	AP
AEE	0.76433				
СР	0.582119	0.720257			
GP	0.551028	0.650529	0.73881		
INDTP	0.600517	0.501539	0.509957	0.726836	
AP	0.657133	0.664674	0.591858	0.613885	0.83118

Sources: Primary Data (2018) using smart PLS (Version 2.0)

Table-3: Hypothesis Testing for TOE Framework

Path	Original Sample	Standard Error	T Statistics	Decision
AEE -> AP	0.267439	0.060007	4.456771	Supported
CP -> AP	0.312051	0.050714	6.153207	Supported
GP -> AP	0.121832	0.055299	2.203168	Supported
INDTP -> AP	0.234648	0.054814	4.280806	Supported

Sources: Primary Data (2018) using smart PLS (Version 2.0)