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## Article

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## Article

# E-Commerce and SME Performance: The Moderating Influence of Entrepreneurial Competencies

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**Abstract:** This research aims to examine the mediating role of the use of the e-commerce and moderating influence of entrepreneurial competencies on the performance of small and medium enterprises (SMEs). The study data were collected via a structured questionnaire comprised of a seven-point Likert scale from practitioners serving at the top and middle-level positions in Pakistani SMEs. The Partial Least Squares Structural Equation Modelling (PLS-SEM) technique was applied on 250 useable returned questionnaires. The results showed that the association between the use of e-commerce and firm performance is positively significant. Moreover, the use of e-commerce mediates the positive association between technological readiness, adoption cost, and firm performance. However, the moderating role of entrepreneurial competencies does not appear as significant between the use of e-commerce and manufacturing SMEs' performance. The present study is the first to explore entrepreneurial competencies as a moderator between e-commerce adoption and firm performance. The empirical outcomes of this research provide useful theoretical and practical implications for the managers and practitioners to understand the underlying factors for the successful implementation of e-commerce in the SME sector to enhance firm performance.

**Keywords:** e-commerce; entrepreneurial competencies; small and medium enterprises; technological readiness; adoption cost; resource-based view; diffusion of innovation; Pakistan



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## 1. Introduction

Enterprise performance has gained considerable traction in recent years (Akbar et al. 2021a; Qureshi et al. 2021; Akbar et al. 2021b). Corporate performance is equally important to practitioners and academicians in the modern business era. Some researchers have analyzed firm performance broadly in terms of financial and non-financial indicators (Han and Hong 2019; Qureshi et al. 2021). However, corporate managers usually employ specific performance indicators such as sales increment, increased market return, investment growth, and return on investment on a year-to-year basis to measure financial performance (Combs et al. 2006; Rajan et al. 2007). Likewise, the firm's non-financial performance can be measured by customer satisfaction, advanced technological innovation, the perceived value of the product, employee satisfaction, and reduction in production time (Aziz et al. 2017; Fantazy et al. 2010).

In a similar context, small and medium enterprises' performances are a significant concern for industrialization and the growth of modern economies (Rajan et al. 2007; Shanmugam 2016), since it plays an imperative role in technological innovation in the context of

business management (Nasuredin et al. 2016). In the modern business era, organizations increasingly push creativity and innovation to take advantage of new opportunities for successful business growth (Halim et al. 2015). Currently, multinational firms are concentrating on the industrial revolution 4.0 (Bousdekis et al. 2019). Likewise, digital technology has completely changed the operational process for small-scale industries. The global economy is moving towards the diverse advantages of Industry 4.0; the result is a higher quality of goods by lowering production costs by automation, artificial intelligence, and 3D printing innovations (Bousdekis et al. 2019), which would ultimately improve firm competitiveness. The rapid growth in technological innovation affects large- as well as small-scale industries.

Among the largest industries in Pakistan, considering total resources, it is not unreasonable to say that Pakistan's manufacturing industry is the country's leading sector. Manufacturing SMEs are considered the spin of the economy in Pakistan. According to Raza et al. (2017), SMEs contribute significantly to the economy of Pakistan, and 90% of all private enterprises are registered as SMEs. In Pakistan, the total number of registered businesses is around 3.2 million; approximately 90% of the businesses are covered under the definition of an SME (SMEDA 2018). Although developing countries' SMEs contribute to around 70% of the GDP, SMEs' contributions to the GDP of the Pakistani economy is approximately 40% and lags behind their neighboring countries by around 30%.

In addition, the manufacturing sector is an essential source of tax revenues and contributes to increasing several job opportunities for semi-skilled, skilled, and unskilled labor. Thus, the government of Pakistan has intensified focus on the advancement and development of the manufacturing industry. Four major categories fall under the manufacturing SMEs of Pakistan, namely, textile, leather, surgical instrument, and sports (Kazmi 2017). At times, the textile industry was the significant driver of the economy of Pakistan in terms of employment generation and country exports. However, the SME sector is severely affected by a lack of innovation capability and less focus on technological upgradation (Bilal et al. 2016). The share of textile SMEs in the global market has remained stagnant at 1.6%.

Similarly, the leather industry comprises four sub-sectors: garments, gloves, shoe uppers, and leather goods (Kazmi 2017). According to the Pakistan Tanner Association (PTA 2015), the leather industry earned 948 million USD yearly from its exports (Khan and Ali 2020). At present, the leather industry's export growth also had a negative change of 8.41 percent (EconomicSurvey 2019).

Likewise, sports goods SMEs play an essential role in the manufacturing sector. There is a broad category of sports products in manufacturing units such as polo sticks, hockey sticks, and cricket bats (Kazmi 2017). At present, the sports goods industry shows a negative growth of 9.04 percent in terms of exports (EconomicSurvey 2019). Lastly, the exporters and manufacturers of surgical instruments mainly deal with the surgical industries, veterinary instruments, dental instruments, tailor scissors, beauty salon instruments, manicure and pedicure items, and hairstylist scissors. Moreover, around 1900 SME surgical units produce a range of 10 to 500 products by using approximately 100,000 workers (The Financial Daily 2018). Presently, Pakistan's surgical instrument industry contributes 221.7 million USD in total exports of 2017–2018. However, in 2018–2019, Pakistani surgical SMEs experienced negative export growth (Pakistan Bureau of Statistics 2019).

Theoretically, previous researchers have examined the adoption of big data, usage of ERP (Yadegaridehkordi et al. 2020), use of e-government (Heredia-Calzado and Duréndez 2019), and use of e-marketing (Sheikh et al. 2018) as a mediator. Moreover, previous scholars have suggested developing a model using e-commerce adoption/usage as a mediating variable for developing countries (Hassen et al. 2019). Similarly, based on the RBV theory, entrepreneurial competency is also a valuable resource, and the theory argues that resources may eventually lead towards business success and performance (Kabir et al. 2017; Tehseen and Ramayah 2015). On the contrary, there is a dearth of research to explore the causal relationship between information communication technology (e-commerce) and productivity (DeStefano et al. 2018). These inconsistent results suggested a need to apply a moderator between the use of e-commerce and firm performance. Hence, in the present

study, entrepreneurial competency is a moderator between Technological, organizational, and environmental (TOE) factors and the performance of SMEs. The first objective of this study is to examine the influence of TOE context factors on the use of e-commerce. Second, the paper examines to what extent does the use of e-commerce mediate the relationship between TOE factors and firm performance. Third, the study addresses the moderating role of entrepreneurial competencies between the use of e-commerce and SMEs' firm performance.

This article is further divided into four sections. Section 2 covers the compelling literature and development of the theoretical framework. In Section 3, the research design and its specific ingredients are discussed. Section 4 explains the analysis and results for identified hypotheses. Lastly, Section 5 concludes the present study and provides the limitations of this research paper.

## 2. Literature Review

### 2.1. Technological Readiness and Use of E-Commerce

Technological readiness is referred to as "the combination of IT infrastructure and IT human resources" (Zhu and Kraemer 2005). These resources are obligatory if organizations want to introduce e-commerce in their business operations (Caputo et al. 2019; Oliveira and Martins 2010a). Managers identify different choices to adopt technologies in their organizations. Similarly, it is also found by Zhu et al. (2003) that IT infrastructure and human skills of employees are two significant factors towards technological adoption. Thus, the combined effect of IT infrastructure and IT human resource expertise (technological readiness) needed further investigation. The previous literature depicts that the IT infrastructure and IT human skills' role significantly influences firm performance (Braojos et al. 2019; Caputo et al. 2019).

On the contrary, Hyung and Dedahanov (2014) examined that the association between technological innovation and performance is significantly weak. Hence, further investigation is required to explore IT infrastructure and IT experts' combined effect on e-commerce usage. Therefore, the hypothesis is proposed as follows:

**Hypothesis 1.** *Technological readiness has a positive significant impact on the use of e-commerce.*

### 2.2. Adoption Cost and Use of E-Commerce

The adoption of technology such as e-commerce needs some essential technological resources, for instance, IT infrastructure, internet network, software, hardware, and IT personnel. All of these necessities are quite expensive, particularly for small and medium firms. Moreover, cost remains a significant impediment in adopting/using technology, particularly for SMEs (Wymer and Regan 2015). Although the adoption cost of certain technological innovations also distresses the speed of technological adoption, in the present study, adoption costs included both initial technology usage and training costs to use that technology. Additionally, the adoption cost was considered essential for e-commerce usage (Domun and Bheemul 2019). Furthermore, the money or resources spend to adopt these technologies directly influence the speed of usage of that particular technology, especially in small businesses (Mohtaramzadeh et al. 2018). Therefore, there is a need to further investigate the adoption cost and the use of e-commerce.

**Hypothesis 2.** *Adoption cost negatively influences the use of e-commerce.*

### 2.3. Government Support and Use of E-Commerce

Government support means the encouraging businesses to use technology. Government support plays an essential role in making the industry policies effective (Manning et al. 2012), and in improving organizational innovativeness. In developing countries such as China, the government has started many support programs by creating subsidiaries at different levels to support SMEs (Lin and Luan 2020). Governments mainly focus on

large industry policies such as financial incentives criteria, and training and development programs to adopt new technologies (Merhi and Ahluwalia 2017). Thus, it is reasonable to further study the government support for SMEs, particularly for technological innovation such as the use of e-commerce. Therefore, the current study proposed the following hypothesis:

**Hypothesis 3.** *Government support positively influences the use of e-commerce.*

#### 2.4. Use of E-Commerce and Firm Performance

In the digitization era, technological innovation is an essential element to be successful among competitors. Similarly, the adoption of technology such as e-commerce is changing the way businesses are conducted across the world (Sunayana and Parveen 2019). Hence, business operations are becoming more effective and competitive in the era of digital technology. Additionally, the literature highlights considerable evidence that e-commerce usage has a positive influence on the performances of small and medium industries (SMIs) by improving business processes (Wardoyo et al. 2018). Moreover, it is also investigated that e-commerce as a mediating variable needs future research to be better understood (Hassen et al. 2019). Likewise, the influence of e-business is also positive on organizational performance. Therefore, the present study posits the following hypothesis:

**Hypothesis 4.** *The use of e-commerce is positively significant on the firm performance.*

#### 2.5. Entrepreneurial Competencies Relationship with Firm Performance

According to Boyatzis (1982) competencies related to managers have two broad dimensions. The first type is related to human behavior, which has twenty-one different types. The second type of competency has three dimensions such as traits, social roles, and skills. Based on the types mentioned above, managers have different capabilities that influence performance. By definition, the term entrepreneurial competencies refer to “entrepreneurs’ overall sum of attributes such as beliefs, attitudes, skills, knowledge, personality, abilities behavioral tendencies and expertise needed for sustaining and successful entrepreneurship” (Kiggundu 2002).

Similarly, consistent with the above study, Gerli et al. (2011) concluded that entrepreneurial competency is directly related to business performance and result in higher entrepreneurial performance. Other authors also suggested that strategic factors such as entrepreneurial competencies significantly impact SME performance (Grimmer et al. 2017; Hashim et al. 2018). Therefore, the present study proposed the following hypothesis.

**Hypothesis 5.** *Entrepreneurial competencies have a significant influence on firm performance.*

#### 2.6. The Mediating Role of Use of E-Commerce between TOE Model and Firm Performance

Technological resources are considered critical factors in the success of information systems (ISs) (Zain et al. 2005). According to previous researchers, technological readiness means combining two resources: IT human resource and IT infrastructure (Zhu and Kraemer 2005). Both are an essential part of firms’ operations if the firm wants to use e-business (Oliveira and Martins 2010a). Similarly, Teo and Ranganathan (2004) also suggest that, if any firm adopts e-commerce, it will be more likely to improve its IT infrastructure. Likewise, Oliveira and Martins (2010b) also determine that companies without sufficient IT skills are less likely to adopt e-commerce in their operations.

Studies have emphasized that organizational factors correlate with business performance, particularly in SMEs (Bala and Feng 2019). Furthermore, Sila (2010) confirmed that e-commerce usage does not directly influence the firm’s operational performance. However, it can enhance operational efficiency, which subsequently increases operational performance. Therefore, there is an extensive need to further study the adoption of technology as

a mediator between organizational factors such as adoption cost and firm performance of SMEs.

Moreover, the implementation of technology such as electronic commerce is a difficult task without the government's support, particularly for SMEs. Similarly, the literature supports the positive correlation between government support and technology usage but the results are inconsistent. Therefore, to assess the impact of government support regarding technological adoption, there is a need for further empirical investigation. Additionally, government support positively affects firm performance (Han et al. 2017). Thus, the above discussion formulates the following hypotheses.

**Hypothesis 6.** *The use of e-commerce mediates the relationship between technological readiness and firm performance.*

**Hypothesis 7.** *The use of e-commerce mediates the relationship between adoption cost and firm performance.*

**Hypothesis 8.** *The use of e-commerce mediates the relationship between government support and firm performance.*

#### *2.7. Entrepreneurial Competencies as a Moderator between the Use of E-Commerce and Firm Performance*

In previous literature, it was observed that small firms' performances are influenced by strategic factors of the organization such as entrepreneurial competencies (Grimmer et al. 2017). The RBV theory provides theoretical underpinning for entrepreneurial competencies as capabilities to obtain a competitive advantage and to enhance firm performance (Kabir et al. 2017). Moreover, it is also suggested that e-commerce has a significant influence on three different dimensions of performance: increased sales, efficiency and productivity, and coordination (Kraemer et al. 2005). On the contrary, there is no causal impact of technological innovation and productivity (DeStefano et al. 2018). Therefore, based on the above discussion, the present study has proposed a moderator between the use of e-commerce and firm performance.

**Hypothesis 9.** *Entrepreneurial competencies positively moderate the relationship between the use of e-commerce and firm performance of SMEs.*

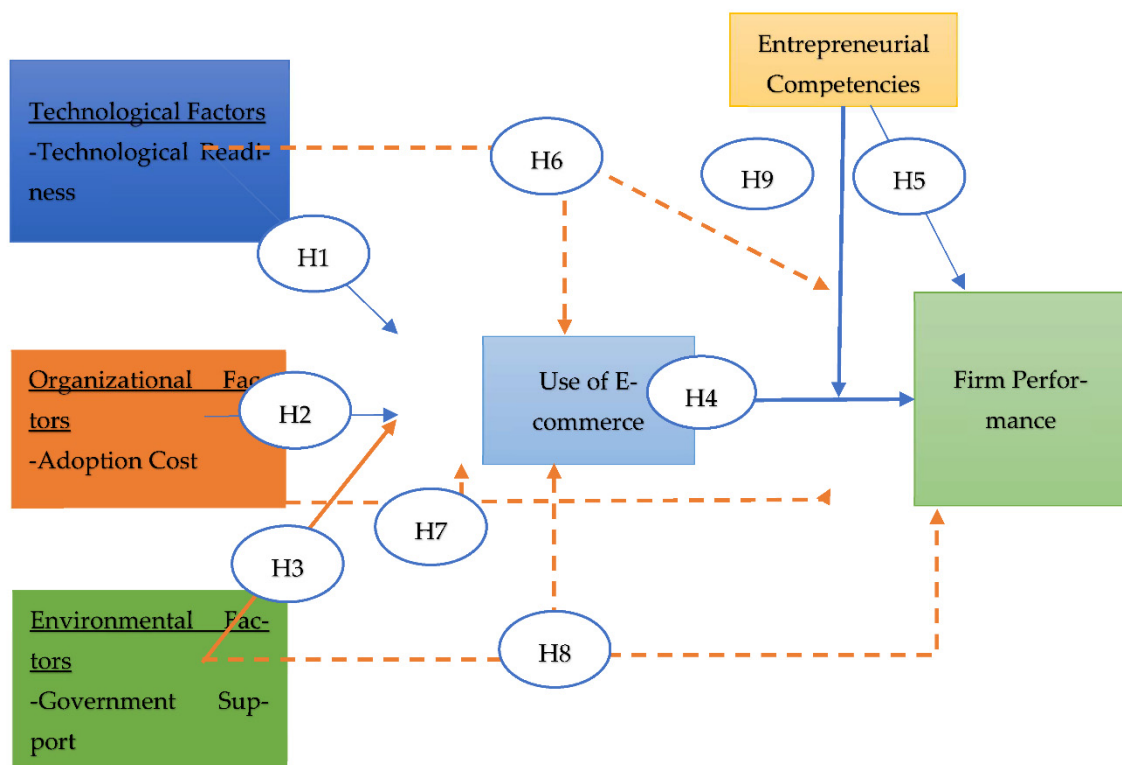
#### *2.8. Theoretical Framework*

The theoretical foundation of the current study is based on the underlying principles of Resource Base View (RBV) theory provided by Barney in 1991. According to RBV, the competitive advantage for firms results from organizational resources that are valuable, unique, and difficult to imitate. Likewise, resources related to technological readiness and adoption cost are required to acquire certain technologies such as e-commerce to enhance the organizations system efficiency and to gain the advantages of technological readiness. However, government support is another significant factor that can drive firms to use e-commerce to continuously enhance firm performance with the help of entrepreneurial competency. However, the specific competencies of SMEs' entrepreneurs are essential for successfully identifying business opportunities.

Likewise, the DOI theory was introduced by Rogers in his book *Diffusion of Innovation*, which was first published in 1962, with a few more editions afterwards (1971, 1983, 1995, and 2003). Roger explained innovation as "an idea, practices, or object that is perceived to be new by an individual or another unit of adoption". The theory has supported technology usage studies (Mohtaramzadeh et al. 2018). Likewise, e-commerce has been applied in manufacturing SMEs to enhance efficiency and ultimately to achieve a competitive advantage over rivals. Therefore, based on DOI theory, technological adoption (e-commerce) towards firm performance is supported by DOI theory.

In addition, in technological innovation studies, the TOE model is frequently used (Hussain et al. 2020). This theory says that firm structure should fit its organizational and environmental needs (Lawrence and Lorsch 1967). Afterwards, in 1990, Tornatzky and Fleischer emphasized that adopting technology in an enterprise is a multidimensional and critical decision influenced by several factors. In this framework, Tornatzky and colleagues identified and classified the factors into three contexts: TOE. The contexts above of the model act as an opportunity and/or constraint for “technological innovation”.

Moreover, several studies have depicted the TOE framework with institutional theory (Oliveira and Martins 2010b; Zhu et al. 2006). For example, the adoption predictors in DOI include individual leader characteristics and internal organization characteristics that are compatible with the organizational context of the TOE. Likewise, the system openness in DOI is compatible with the TOE factors as shown in Figure 1. Finally, researchers implicitly emphasized that Rogers’s innovation attributes are compatible with the technological context (Baker 2012; Zhu et al. 2006).



**Figure 1.** Theoretical framework.

It is indisputable that the use of e-commerce has grown as a popular research area for scholars since the 1990s, after the commercialization of the internet. However, Roger’s Diffusion of innovation (DOI) theory has been used more frequently in e-commerce adoption studies (Al-Bakri and Katsioloudes 2015; Al-Qirim 2007). However, very few studies have looked into the Technology, Organizational, Environmental (TOE) model with DOI and RBV theories.

### 3. Methodology

#### *Research Design, Population, and Sampling Technique*

The research design combines research components into a reasonable, logical, and efficient method. Integrating an overall strategy by measuring and analyzing data ensures effective, credible, and systematic ways to resolve research problems and to answer research questions. The research design makes sure that the research questions are as accurately answered as possible by the data gathered for the research (Kumar 2019).

In Pakistan, around 3.2 million businesses are registered; among them, approximately 90% of the companies are categorized into small and medium enterprises worldwide (SMEDA 2018). However, 254 manufacturing SMEs were selected by following the sample size table by Morgan (2012) using the “cluster random sampling technique”. The population was divided into four clusters on the geographical distribution of provinces such as Sindh, Punjab, Balochistan, and Khyber Pakhtunkhwa. However, the Sindh and Punjab provinces were selected randomly because they have larger manufacturing SMEs. Therefore, six hundred (600) questionnaires were systematically sent via a Google Form link to the top and middle-level managers. The current study questionnaire was adapted from previous studies; the firm performance scale was adapted from (Deshpandé and Farley 1998; Jaworski and Kohli 1993). Likewise, seven items were adapted from the study conducted by Gibbs and Kraemer (2004) to measure the use of e-commerce; the questionnaire related to the technological readiness was adapted from Molla and Licker (2005) to measure top management support, the four-item scale by Soliman and Janz (2004) was adapted; and competitive pressure was measured using the Jaworski and Kohli (1993) questionnaire. Lastly, the moderating role of entrepreneurial competencies was measured using the four-item questionnaire from (Man et al. 2008).

This data collection took almost six and a half months, starting from May 2020 to December 2020. As mentioned in Table 1, 287 questionnaires were returned, out of which 37 questionnaires were not included in the analysis because they were incorrectly filled or incomplete. Thus, 250 questionnaires were used for the analyses.

**Table 1.** Questionnaire distribution and response rate.

Questionnaire	Response Rate
Questionnaires distributed	600
Number of questionnaires returned	287
Questionnaires not matching the criteria	21
Questionnaires, not complete	16
Usable questionnaires	250
Percentage of returned questionnaires	47.8%
Percentage of usable questionnaire	41.6%

#### 4. Data Analysis and Findings

The present study employed SPSS 25 to measure the descriptive statistics of the study. Similarly, for inferential statistics, the study used Structural Equation Modeling (SEM) by employing a Partial Least Square (PLS) 3.3.2 for data analysis purposes Sarstedt et al. (2017).

##### 4.1. Respondents' Profile

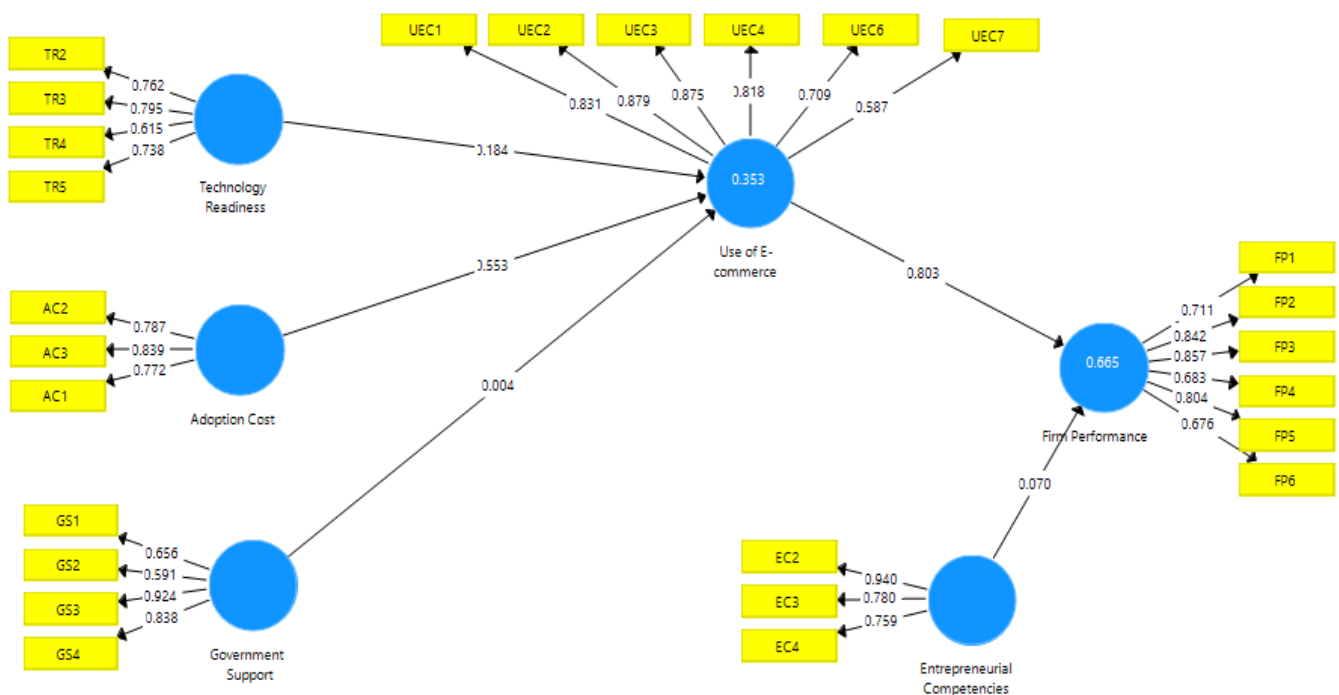
Table 2 depicts a gender analysis of male participants with a response rate of 74.8% in the demographic analysis, while the female response rate was 25.2%. In Pakistani Manufacturing SMEs, the age group of the managers revealed that 38.8% of the respondents are in the age bracket of 31–40 years. Lastly, the “Experience of using e-commerce” data verified that most of the managers who participated and had experience using e-commerce belong to the category 1 to 3 years.

**Table 2.** Demographic analysis.

Demographics Respondents Percentage (%)	Frequency	Percentage
Gender		
Male	187	74.8
Female	63	25.2
Age-Group		
21–30 years	63	25.2
31–40 years	97	38.8
More than 40 years	90	36.0
Experience Using E-Commerce		
Below 1 year	65	26.0
Between 1 to 3 years	103	41.2
More than 3 years	82	32.8

#### 4.2. Assessment of Measurement Model

Regarding the assessment of the measurement model, also termed the outer model, the present study analyzed the discriminate validity and internal consistency reliability (Hair et al. 2013), as shown in Figure 2.

**Figure 2.** PLS algorithm measurement model.

##### 4.2.1. Internal Consistency Reliability and Convergent Validity

The internal reliability can be determined by considering the composite reliability (CR) of the constructs. Table 3 predicted that all of the CR values are above the standard value 0.60 Hair et al. (2013). The convergent validity (CR) was explained by Hair et al. (2013) as “the degree to which a latent construct explains the variance of its indicators”. Moreover, 50% of the variance should be achieved by each construct ( $AVE \geq 0.50$ ). The following Table 3 depicted that the values are higher than 0.05. Furthermore, the cross-loading of

each construct must be higher than 0.05 (Hair et al. 2013). The following table reveals that all of the values of loading are between the range of 0.646 and 0.955.

**Table 3.** Reliability and validity of the constructs.

Construct	Items	Loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)
Adoption Cost	AC1	0.772	0.842	0.639
	AC2	0.787		
	AC3	0.839		
Entrepreneurial Competencies	EC2	0.940	0.868	0.689
	EC3	0.780		
	EC4	0.759		
Firm Performance	FP1	0.711	0.894	0.586
	FP2	0.842		
	FP3	0.857		
	FP4	0.683		
	FP5	0.804		
	FP6	0.676		
Government Support	GS1	0.656	0.845	0.584
	GS2	0.591		
	GS3	0.924		
	GS4	0.838		
Technological Readiness	TR2	0.762	0.819	0.534
	TR3	0.795		
	TR4	0.615		
	TR5	0.738		
Use of E-commerce	UEC1	0.831	0.907	0.624
	UEC2	0.879		
	UEC3	0.875		
	UEC4	0.818		
	UEC6	0.709		
	UEC7	0.587		

#### 4.2.2. Discriminate Validity

The discriminate validity was checked by applying Fornell and Larcker's criteria. It is explained as "the extent to which the constructs are different from one another empirically". According to Fornell and Larcker's criteria of discrimination validity, the current results suggest that constructs do not explain a similar phenomenon. Thus, Table 4 below explains that the square root of AVE is higher than the correlation between the latent variables (Fornell and Larcker 1981).

**Table 4.** Discriminate validity matrix.

	AC	EC	FP	GS	TR	UEC
AC	0.800					
EC	0.123	0.830				
FP	0.467	0.177	0.766			
GS	0.040	−0.045	0.100	0.764		
TR	0.064	0.068	0.155	0.400	0.731	
UEC	0.565	0.133	0.812	0.099	0.221	0.790

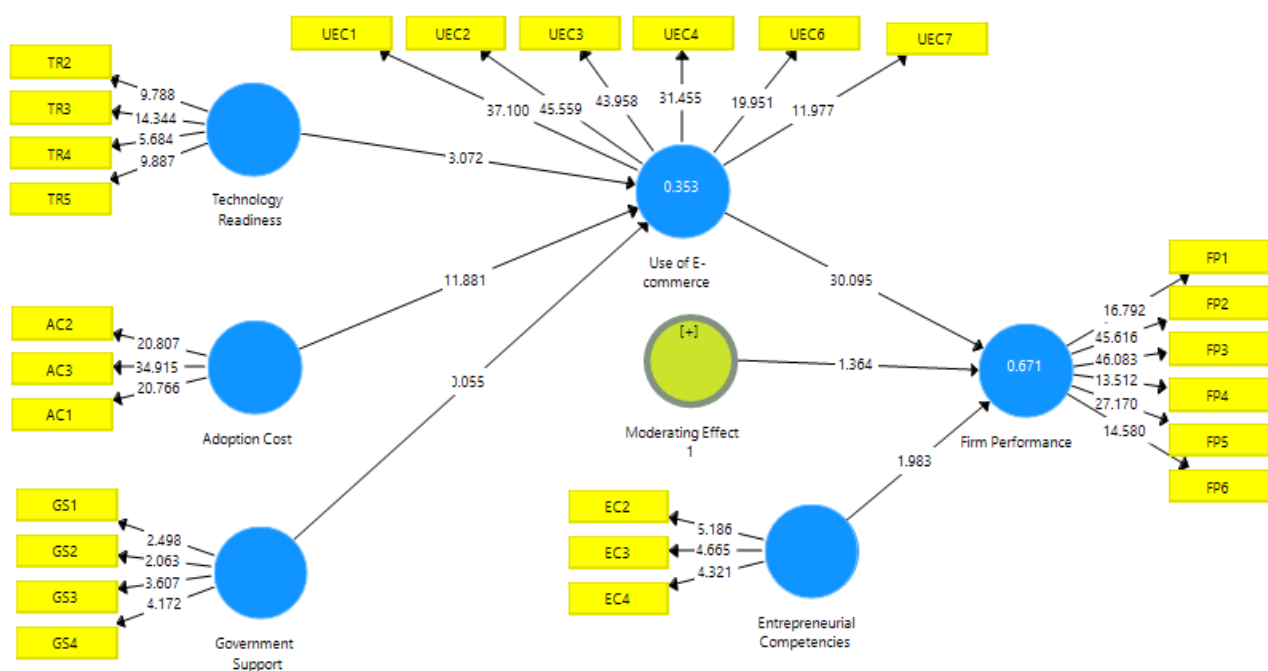
#### 4.3. Assessment of Structural Model

Table 5 mentioned that one out of five hypotheses is not supported based on the standard  $p$  value (0.05). The structural model elaborates the direct effect of the relationships and the  $t$ -value and  $p$ -value to show the hypotheses' significance. Moreover, the study also applied a bootstrapping technique to analyze the indirect (mediation) relationship with e-commerce between exogenous and endogenous variables, as shown in Figure 3.

**Table 5.** Hypothesis testing results (direct effect).

No.	Relationship	Std. Beta	Std. Error	T Values	p Values	0.025	0.975	Decision	VIF	F Square	R <sup>2</sup>	Q <sup>2</sup>
H1	AC → UEC	0.55	0.04	12.43	0.000	0.473	0.620	Supported	1.004	0.471	0.665	0.386
H2	TR → UEC	0.18	0.05	3.23	0.001	0.087	0.273	Supported	1.194	0.044		
H3	GS → UEC	0.00	0.06	0.05	0.479	−0.17	0.080	Not Supported	1.191	0.000		
H4	UEC → FP	0.78	0.02	31.23	0.000	0.752	0.833	Supported	1.046	1.811		
H5	EC → FP	0.07	0.03	1.95	0.025	0.013	0.141	Supported	1.026	0.018	0.353	0.216

Note: TR = Technological Readiness, AC = Adoption Cost, GS = Government Support, UEC = Use of E-commerce, EC = Entrepreneurial Competencies, FP = Firm Performance.

**Figure 3.** The structural model and moderating effect.

The result indicates that H1 ( $\beta = 0.553$ ;  $T = 12.432$ ;  $p < 0.05$ ) and H2 ( $\beta = 0.184$ ;  $T = 3.238$ ;  $p < 0.05$ ) show that a significant association between adoption cost, technological

readiness, and use of e-commerce. Similarly, H4 ( $\beta = 0.077$ ;  $T = 1.957$ ;  $p < 0.05$ ) and H5 ( $\beta = 0.789$ ;  $T = 31.237$ ;  $p < 0.05$ ) show the significant positive link between entrepreneurial competencies and use of e-commerce with SME performance. However, H3 ( $\beta = 0.004$ ;  $T = 0.053$ ;  $p > 0.05$ ) empirically shows that government support has no significant impact on the use of e-commerce.

#### Assessment of Coefficient of Determination ( $R^2$ ), Effect Size ( $f^2$ ), and Predictive Relevance ( $Q^2$ )

The coefficient of determination, denoted by  $R^2$ , explains how much variation in the endogenous variable is due to exogenous constructs. It is also considered a criterion used to assess the structural model. Nevertheless, in this study,  $R^2$  at 0.618 is substantial. However, the coefficient of determination  $R^2$  for the use of e-commerce stood at 0.051, which shows weakness as per the standards. After the analysis of the coefficient of determination ( $R^2$ ), there is a need to examine the effect size ( $f^2$ ) of all of the latent variables of the study. The  $f^2$  threshold values are 0.35, 0.15, and 0.02 for large, small, and no effect size, respectively; in this study, the effect size values show small and no effects, with values of 0.028, 0.005, 0.019, 0.593, and 0.002.

Likewise, the study used the blindfolding method to assess the model's predictive relevance ( $Q^2$ ) ability. As shown in Table 5, the  $Q^2$  values are higher than zero for use of e-commerce (0.216) and firm performance (0.386); this suggests a substantial predictive relevance of the model. This is in line with the suggestion by Henseler and Hubona that  $Q^2$  values greater than zero indicate that the model has predictive relevance while  $Q^2$  values less than zero indicate that the model lacks predictive relevance.

#### 4.4. Mediation Analysis

Among the various methods used to test the mediation, the most commonly used technique is bootstrapping.

In this study, bootstrapping is applied to examine the latent variables' indirect effect by using 5000 subsamples. Table 6 summarizes the result of the indirect relationships of the model.

**Table 6.** Mediation results.

Mediation Result		Std. Beta	Std. Error	T Values	p-Values	2.50%	97.50%	Decision
H6	TR → UEC → FP	0.148	0.045	3.260	0.001	0.070	0.216	Supported
H7	AC → UEC → FP	0.432	0.039	11.122	0.000	0.374	0.500	Supported
H8	GS → UEC → FP	0.010	0.053	0.053	0.479	−0.133	0.064	Not Supported

Note: TR = Technological Readiness, AC = Adoption Cost, GS = Government Support, UEC = Use of E-commerce, FP = Firm Performance.

Therefore, the results of H6 ( $\beta = 0.148$ ;  $T = 3.260$ ;  $p < 0.05$ ) and H7 ( $\beta = 0.432$ ;  $T = 11.122$ ;  $p < 0.05$ ) show that the positive relationship between technological readiness, adoption cost, and firm performance is mediated by the use of e-commerce. These results indicate that H6 and H7 are supported. The result of H8 ( $\beta = 0.010$ ;  $T = 0.053$ ;  $p > 0.05$ ) suggests that the use of e-commerce does not mediate the relationship between government support and firm performance.

#### 4.5. Moderation Analysis

In the moderating effect analysis, we used the PLS algorithm to calculate the standard beta coefficient value, which was 0.084 for entrepreneurial competencies. Likewise, to calculate the  $T$ -value result, we followed a bootstrapping procedure. Table 7 shows that entrepreneurial competencies do not significantly moderate the relationship between the use of e-commerce and manufacturing SMEs' performances.

Table 7. Moderation result.

No.	Relationship	Std. Beta	Std. Error	T Values	p Values	2.50%	97.5%	Decision
H9	Moderating Effect 1 → Firm Performance	0.084	0.060	1.413	0.079	−0.101	0.146	Not Supported

## 5. Discussion and Conclusions

The primary purpose of a discussion is to assess whether the outcomes of the study are consistent with the objectives of the study. The present study provided a theoretical framework to examine technological (technological readiness), organizational (adoption cost), and environmental factors (government support) of the TOE model with the mediating effect of the use of e-commerce on firm performance. The study also employed a moderating role of entrepreneurial competencies. The theoretical foundations of the study are based on a resource-based view and the Diffusion of innovation (DOI).

To achieve the objectives of the study, eight hypotheses were formulated for empirical testing. Four out of five hypotheses were supported, to be specific, in terms of a direct relationship. One out of three hypotheses was not supported in the mediating effect of the relationships. The direct hypotheses reveals that technological readiness has a significant relationship with SME performance, consistent with the previous study (Alsultanny and AlZuhair 2018). Therefore, the findings suggest that the technological infrastructure and IT human skills are necessary elements to implement. Although, in the literature, cost remains a significant impediment for the use of technological innovation, particularly for SMEs (Wymer and Regan 2015), as per the findings of the current study, adoption cost has a significant relationship with the use of e-commerce in manufacturing SMEs of developing countries such as Pakistan.

Furthermore, the hypotheses regarding the effect of government support on the use of e-commerce results are not consistent with the previous literature (Han et al. 2017). In the present study, government support has appeared as an insignificant factor for the use of e-commerce. This proved that there is less government support for the use of e-commerce in Pakistani manufacturing SMEs. However, the study results are consistent with previous literature on the use of e-commerce and firm performance relationships (Braojos et al. 2019; Shahzad et al. 2020).

Regarding the indirect effects (mediation analyses), e-commerce usage mediation has a significant relationship with technological readiness and adoption cost. The current study concluded that, through the mediation of the use of e-commerce technology, readiness and adoption cost could enhance the performance of manufacturing SMEs of Pakistan. However, government support is not an influencing factor in Pakistani manufacturing SMEs.

Lastly, this study finds that entrepreneurial competencies have an insignificant relationship as a moderator between the use of e-commerce and firm performance. The empirical evidence of the study showed that entrepreneurial competencies do not positively impact firm performance. Therefore, the present study concluded that, instead of owner competencies such as negotiation skills, long-term relationships with other business partners, and market-related skills, SME managers/owners need technology-related competencies and more knowledge about e-commerce platforms to obtain a competitive advantage. Moreover, with the theoretical foundation of the RBV, the study found that entrepreneurial competencies are not considered long-term capabilities for manufacturing SMEs of Pakistan.

### 5.1. Implications of the Study

Besides technological, organizational, and environmental factors directly linked with the use of e-commerce, this study goes beyond the tested mediation present among the TOE context factors and firm performance. In addition to the mediation, the moderating role of entrepreneurial competencies served as capabilities between e-commerce and firm performance. For the first time in the literature, this link has been established between the

use of e-commerce and firm performance using the resource-based view (RBV) theory. As a result, the present study has contributed theoretically to the literature and serves to enhance the pool of knowledge and understanding. Therefore, this study provides progressive insight into issues related to the use of e-commerce and ultimately to firm performance.

Moreover, the significant direct and indirect relationships with the use of e-commerce also call upon the SME managers' attentions towards the availability of such resources (independent variables) before implementing e-commerce in their organizations. Hence, this study has tried to explain the essential underlying factors and capabilities required to convert the firm from a traditional way of conducting business to a click and mortar business using e-commerce.

### 5.2. Limitations and Future Recommendation

The implications of the current study are only useful for manufacturing SMEs of Pakistan. Similar research can be conducted in other developing countries by taking the same theoretical foundations. Furthermore, the study model can be useful for retail and service sector SMEs. Moreover, future research can investigate the innovation capabilities, open innovation, and business model innovation as mediators with the theoretical foundation of the TOE model and dynamic capability theory.

### 5.3. Conclusions of the Study

To sum up, this study requires SME practitioners to develop a modern e-commerce infrastructure to increase performance. Top management and entrepreneurs need to build their competencies and to focus on commission-based cloud platforms of e-commerce for their future growth. Likewise, the government's role should be to invest in the technological infrastructure for robust internet connectivity in urban and rural areas. Furthermore, to promote e-commerce platforms for SMEs. Furthermore, the present study requires SME owners to look at technological readiness, adoption cost, and entrepreneurial competencies to achieve optimal benefits by implementing e-commerce.

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