Interfering Factors of Use of E-Commerce Toward Innovative Performance of SMEs by Moderating Effect of E-commerce Marketing Capabilities

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The performance of Small and Medium-sized Enterprises (SMEs), crucial to technological innovation within business and management, is a key obstacle to industrialization and creating a reaction to the changes. In the current study, the relationship between Technological, Organizational, and Environmental (TOE) aspects and the innovative performance of SMEs is mediated and moderated by the use of e-commerce and the efficiency of e-commerce marketing. In the present study, data were gathered through both face-to-face and online methods from proprietors and managers of SMEs operating in six prominent cities in Pakistan. Nearly 274 participants were randomly chosen to participate in the data collection. While 250 completed surveys were used for the analyses due to the unfinished survey report. The current study employed SPSS 25 to calculate the descriptive statistics, Smart Partial Least Square (PLS) 3.3.2 to analyze the data, and SEM to calculate the inferential statistics. The study's findings indicate that the environmental component, the use of e-commerce, and the technology factor (technology readiness) are all positively correlated. Similarly, there is a negative association between organizational factors (adoption cost) and the use of e-commerce. In contrast, there is a positive relationship between the use of e-commerce and the innovative performance of SMEs (IP). The usage of e-commerce does not mediate adoption cost and innovative performance, but Technology Readiness (TR), Government Support (GS), and Innovative Performance (IP) do. The utilization of e-commerce and innovative performance and e-commerce marketing capabilities do not moderately correlate.

Keywords: Use of E-commerce, Innovative Performance of SMEs, E-commerce marketing Capabilities, Technology Readiness, Entrepreneurial Competencies, Adoption Cost, Government Support.

Small and Medium-sized Enterprises (SMEs)
Small and Medium Enterprise Development Authority (SMEDA)
Enterprise Resource Planning (ERP)
Resource-based view theory (RBV)
Technological Organizational, and Environmental (TOE)
Use of E-Commerce (UOEC)
Diffusion of Innovation Theory (DOI Theory)
Technology Readiness (TR)
E-commerce Market Capabilities (ECMC)
Innovative Performance (IP)
Adoption Cost (AC)
Government Support (GS)
Small and Medium Enterprises Authority (SMEDA)
Partial Least Square (PLS)
Structural Equation Modeling (SEM)
Composite Reliability (CR)
Convergent Validity (CV)

Introduction:

Enterprise performance has witnessed a notable surge over the last few years [1][2]. In the contemporary economic landscape, corporate success is highly regarded by both academics and business professionals. To measure business performance generally, several researchers have combined financial and non-financial metrics [2]. Similar to this, the performance of Small and Medium-sized Enterprises (SMEs) is a critical concern for industrialization and the development of responses to changes [3][4], as they play a crucial role in technological innovation within the context of business and management [5][6].

In the contemporary corporate world, organizations are increasingly encouraging innovation and creativity to take advantage of new chances for profitable business expansion [7]. Multinational corporations actively concentrate on the fourth industrial revolution [8][9]. Similarly, digital technology has significantly altered how small-scale industries operate. Due to advancements in automation, artificial intelligence, and 3D printing, the world economy is heading towards reaping the myriad advantages of Industry 4.0, including increased product quality and cheaper production costs [8]. Consequently, this would ultimately intensify corporate competition, as the increase in technological innovation affects both large and small firms alike.

The SME sector plays a pivotal role in driving the nation's economic growth and it is widely regarded as the cornerstone of the economy. Small and Medium Enterprise Development Authority (SMEDA) states that Pakistan has over 5 million SMEs. These exports account for 25% of all exports and 40% of Pakistan's overall export GDP. The SME sector employs the largest share of the working population in the nation after the agriculture industry. In the non-agricultural economy, 78% of jobs are in the SME sector. SMEs are a critical factor in the expansion of the national economy, the creation of new jobs, and the reduction of poverty. Moreover, finance in this sector began to increase in 2013 due to many regulatory actions and the State Bank of Pakistan's facilitative role [10].

The COVID-19 pandemic reshaped people's lives, and the term "social distancing" emerged as a measure to protect public health and curtail the transmission and spread of COVID-19. In addition to its many other benefits, online shopping is a feasible alternative to traditional ways of payment and a blessing for halting the spread of COVID-19. Traditional purchase routes need personal contact, which raises the probability of COVID-19 transmission. To benefit the typical consumer and open up new prospects for both small and large businesses, it is essential to implement E-commerce on a global scale [11].

Novelty Statement:

Previous scholars have advocated for the adoption of big data, Enterprise Resource Planning (ERP), e-government, e-marketing, and the role of e-marketing as a mediator [12][13][14]. Additionally, past studies have recommended developing a model incorporating the acceptance and adoption of e-commerce in developing nations as a mediating variable [15]. The Resource-Based View theory (RBV) sees entrepreneurial competence as a resource of equal importance. The theory states that resources may eventually assist organizations in operating effectively and achieving their objectives [16][17][18].

The research should encompass the examination of organizational, technological, and environmental dimensions concerning the utilization of e-commerce within SMEs, as well as the impact of e-commerce marketing capabilities on SMEs' innovation capabilities. As a result, in the current study, the relationship between Technological Organizational, and Environmental (TOE) aspects and the innovative performance of SMEs in Pakistan is mediated and moderated by the Use of E-Commerce (UOEC) and e-commerce marketing capabilities.

Objectives of the Study:

This study aimed to determine how TOE context elements (i.e. Technology: Technology Readiness, Organizational: Adoption Cost, Environmental: Government Support) impact e-

commerce usage. The second part of the study examines the degree to which e-commerce usage mediates the connection between TOE traits and SME's innovative performance. The results section of this study investigates how the marketing capabilities of e-commerce may influence SME's ability to innovate and their adoption of e-commerce. Figure 1 illustrates a flowchart that represents the sequential steps of the research study.

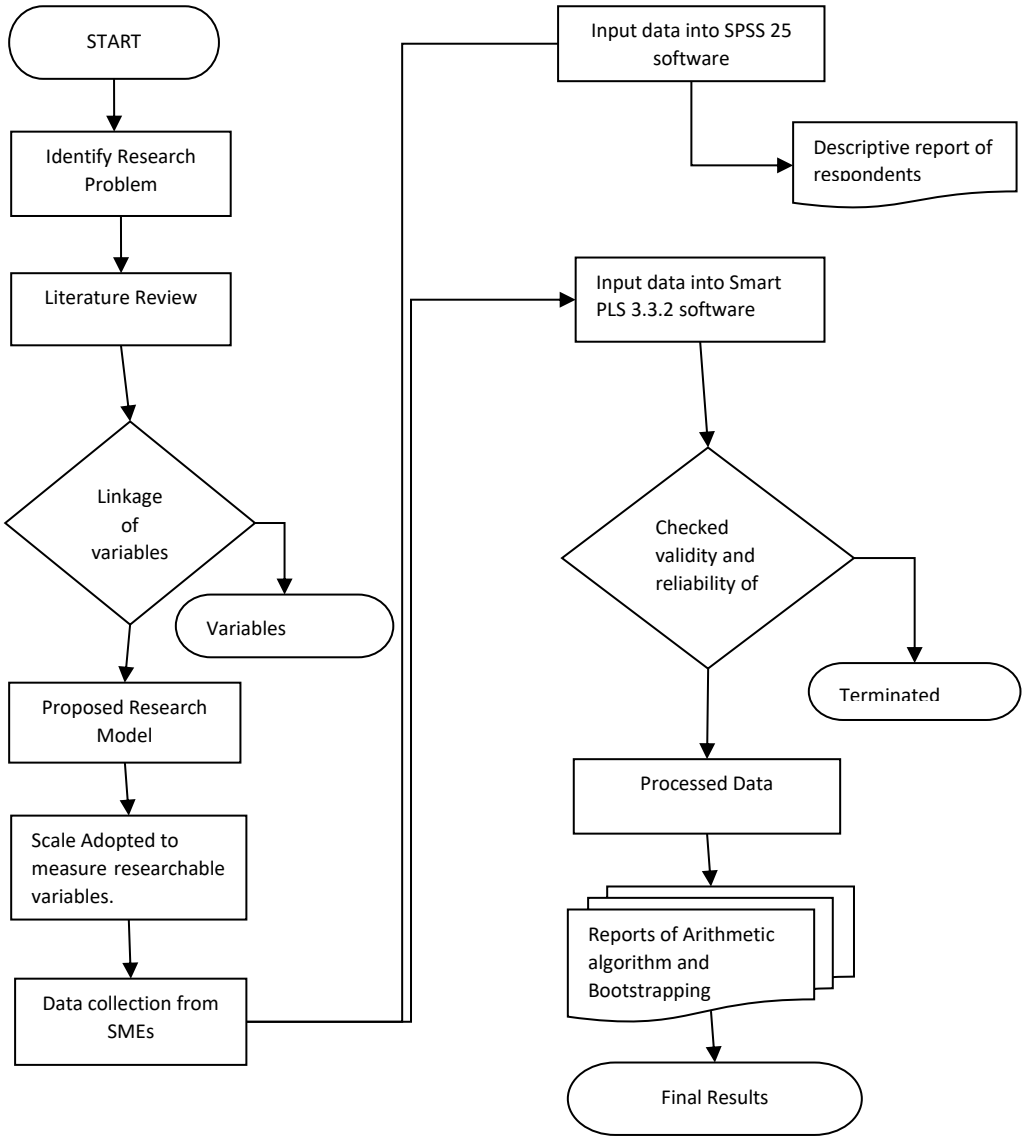

Figure 1: Flow chart of sequential steps taken from data collection to get the final results.

Resource-Based View Theory (RBV Theory):

Following the RBV theory, organizations can enhance their competitive advantage by possessing and effectively leveraging resources and competencies that are valuable, rare, distinctive, and non-replicable. This is particularly relevant in areas such as cost leadership, quality, or other aspects of differentiation [16]. To ascertain how these resources can be amalgamated to realize innovative performance, it is crucial to gain insights into the interconnections among diverse resources within the context of the RBV framework. [19]. Because of this, RBV is considered as a workable theoretical framework for analyzing the effects of resources like technology readiness, adoption costs, and government support on the use of e-commerce and the overall innovative performance of SMEs.

DOI Theory (Diffusion of Innovation Theory). The fundamental objective of innovation dissemination is to have a novelty (in science, technology, or community development) accepted

by members of a particular social system. Social systems comprise individuals, unofficial groups, and neighborhood associations. The main objective of innovation distribution is adopting an advancement, such as ideas, science, or technology, by both people and specific social groups. As a result, some claim that four innovation characteristics can affect how widely some individuals and social groups accept them. Adopting an e-learning system as part of the employee acceptance stage is an employee training and learning innovation. [20] claim that adoption decisions are influenced by several variables, including the availability of technology information (such as competitive advantages, compatibility, etc.), adopter traits (such as prior experience), social system traits (such as governance mechanisms, social norms, the allocation of transformational leaders), and communication processes. The DOI theory suits the E-commerce market's capacities for SMEs' creative performance in this strategy.

Technology Readiness (TR), Use of E-commerce (UOEC) & Innovative Performance (IP):

TR is a vital component of the TOE model. TR levels are mainly used to help management decide how to advance and transfer technology. As a result, an organization will likely adopt IT technology rises as its TR level does, and vice versa. Organizational preparation indicates having the financial and technological resources to facilitate the introduction of E-commerce. The "combination of IT infrastructure and IT human resources" is TR. In order for businesses to integrate e-commerce into their daily operations, they need several essential resources [21]. The compatibility of E-business with both companies' working practices significantly impacted the introduction of E-commerce [22]. If top management believes e-commerce will increase the effectiveness and efficiency of an organization's operations, that decision will be considered. Therefore, businesses that have a higher adoption of e-commerce are expected to be more likely if innovative technologies receive high-level support. Another major part of technology adoption is organizational readiness, which refers to how prepared an individual is to deploy innovation [23].

However, [24] discovered little connection between performance and technological innovation. Therefore, more research is required to determine how IT infrastructures and professionals collectively affect E-commerce use. As a result, the following assertion is made:

H1: There is a positive relationship between TR and UOEC.

H2: There is a mediating relationship of UOEC between TR and IP.

Adoption Cost (AC), & Innovative Performance (IP) along UOEC:

While e-commerce has assisted SMEs in reducing expenses, enhancing efficiency, and providing customers with the convenience of online shopping and secure instant payments, challenges persisted in its adoption by these businesses [25][24][26].

Businesses can engage directly with customers at a low cost by using adoption charges since they are cost-effective [27]. Adoption expenditures are a kind of investment that can help businesses over the long term. The study accounted for adoption costs, including initial technology adoption and training expenses, as well as the cost of some technological advancements, which, although they could slow down the rate of technological adoption, were factored into the analysis. Additionally, the adoption cost was significant for the use of e-commerce, according to [28]. Further, the rate at which these technologies are adopted, particularly in small enterprises, is directly influenced by the amount of money or resources invested in doing so [29]. As a result, the hypothesis under research is:

H3: There is a negative effect of AC on UOEC.

H4: There is a mediating relationship of UOEC between AC and IP

Exploring the Dynamics of Adoption Cost (AC), UOEC, & IP: The government should implement a "dual circulation" strategy to promote the expansion of B2B E-commerce transactions and to regulate cross-border E-commerce activity. It provides financial support, lowers enterprise tax rates, improves cross-border e-commerce infrastructure, and raises the

effectiveness of customs clearance to reduce the cost of cross-border B2B export enterprises [30]. Governments focus their attention mainly on rules impacting significant industries, such as financial incentive standards, training and advancement programs for implementing new technologies, and the UEA government has provided financial support to the Covid-19 pandemic in order to sustain employment levels and the flexibility of small and medium-sized businesses throughout the pandemic [31]. Governments in several different countries have provided financial support for the Covid-19 pandemic in 2022 [27].

It is logical to further investigate the extent of government support for SMEs, particularly in the context of recent technological advancements, such as the utilization of e-commerce. The idea that innovation is one of the critical factors in business success and long-term economic development has gained widespread recognition. However, the issue of incomplete information and the need for more outside funding may contribute to underinvestment in R&D activities. Therefore, governments support businesses in reducing the risk of market inefficiency to foster corporate innovation activities. As a result, the current study suggested the following:

H5: There is a positive effect of GS on UOEC.

H6: There is a mediating relationship of UOEC between GS and IP.

Use of E-commerce (UOEC) and Innovative Performance (IP):

Through digital platforms like e-commerce, businesses can improve their internal and external communications [32]. Particularly about the codification and concentration of information across various organizational players, digital platforms are helpful.

On the other hand, creating original knowledge, which derives from enterprises' internal and external resources, is the main focus of innovation operations. SMEs with standardized digital platforms (e-commerce) are more likely to create novel ideas, formulate them, and implement this innovation performance [33]. As a result, the primary hypothesis in the current investigation is formulated as follows:

H7: There is a favorable influence of UOEC on IP.

Moderate relationship of E-Commerce Market Capabilities (ECMC):

According to [34], organizations select value propositions through their marketing capabilities, allowing them to manage the resources available to provide such value propositions. Developing an organization's ECMC and integrating its current marketing initiatives depend on digital platforms [35].

According to [34], digital platforms like e-commerce have a growing value for improving an organization's ECMC [36]. E-commerce marketing skills control innovative performance and digital platforms.

H8: The relationship between the UOEC and IP is moderated by ECMC.

Methodology:

Research Design (Data Collection and Response Rate):

Data were collected once, at a particular time, using a cross-sectional research technique. The SMEDA provided the list of SMEs. An online survey method was used in the current study to collect information from the owners and managers of SMEs operating in six significant cities in Pakistan. A total number of 274 participants were randomly chosen to participate in the data collection.

The survey used in this study was adapted from prior research. [37] introduced seven criteria to assess "UOEC." The primary obstacle to e-commerce adoption is technological readiness. [38] extracted four key points from various articles. Organizational aspects (adoption cost) represent the second influencing factor, as referenced in three of the four items along with [39], [40], and [38]. The third factor obstructing e-commerce use is the environmental component (GS). Four items derived from [41] encompass the two aspects of innovation efficacy and efficiency, defining the dependent variable "(IP)" since 2008. Seven items for

measuring the moderating variable, "ECMC," were collected from [36] and [42]. This data was gathered during about six and a half months, starting in May 2022 and ending in December 2022. Nearly 24 of the 274 received questionnaires needed to be completed or correctly completed. Hence, they were disqualified from the study.

Research Model:

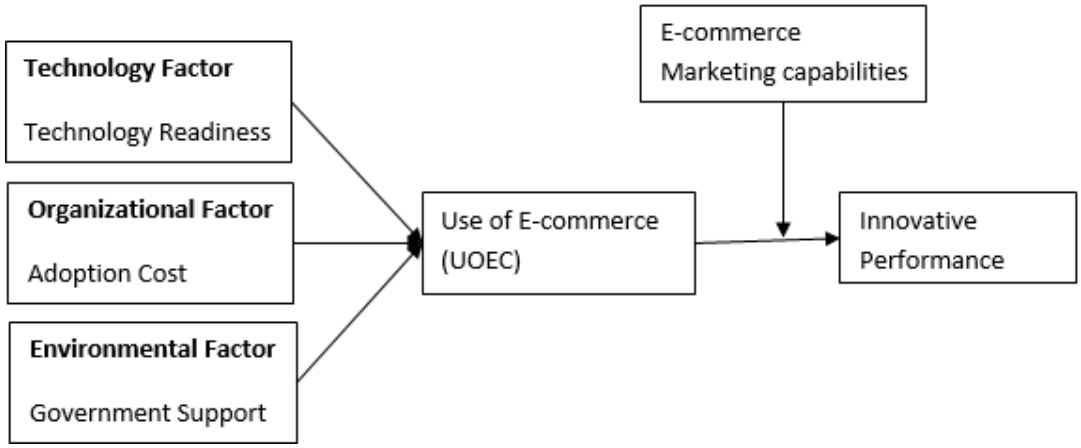

Figure 2: Proposed Research Model

Data Analysis and Findings:

The current study employed SPSS 25 to generate the descriptive statistics, Partial Least Square (PLS) 3.3.2 to analyze the data, and SEM to calculate the inferential statistics [43][44].

Respondents Profile:

According to Table 1, men responded to the questionnaire survey at 84.8%, while women responded at a rate of 15.2%. According to the managers' age distribution in Pakistani SMEs, 38.8% of respondents were between 31 and 40. Last but not least, data from the study "Experience of Using E-Commerce" showed that most managers with e-commerce experience have between one and three years of experience.

Table 1: Demographic data.

Respondents	Frequency	Percentage
Gender		
Male	212	84.8%
Female	38	15.2%
Age-Group		
21-30 years	76	30.4%
31-40 years	97	38.8%
More than 40 years	77	30.8%
Experience Using E-Commerce		
Below 1 year	50	20%
Between 1 to 3 year	120	48%
More than 3 years	80	32%

Result of Measurement Model:

The present study examined the discriminating validity and internal consistency reliability about the evaluation of the measurement model, also known as the outer model [45] as illustrated in Figure 3.

Internal Consistency Reliability and Convergent Validity:

Its internal dependability could be determined by considering the constructs' Composite Reliability (CR). As [45] predicted, Table 3 shows that all CR values are more significant than the median value of 0.60. A latent variable's Convergent Validity (CV), according to [45], is "the

extent to which a latent variable explains the variance of all its indicators." Additionally, 50% of the variance should be explained by each construct (AVE 0.50). According to Table 2 below, the values are more significant than 0.05. The cross-loading of each construct must also be higher than 0.05 [45]. The loading numbers in the table that goes with it are all between 0.646 and 0.955.

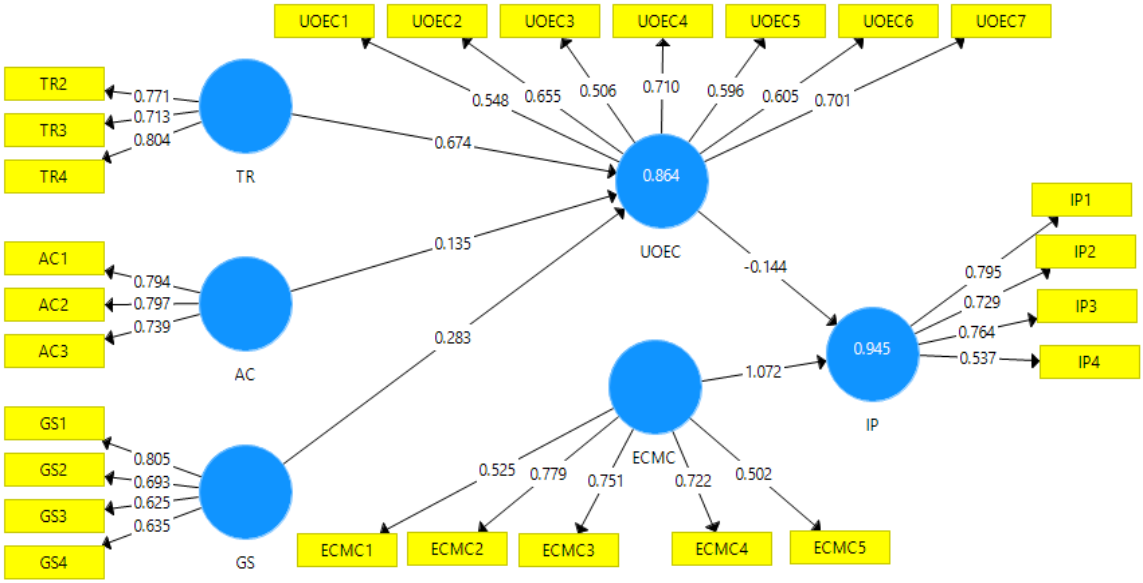

Figure 3: Measurement Model

Source: Smart PLS 3.3.2 result output before the addition of moderator, shows the factor loading values of contacts and β value of relations between contacts.

Table 2: Reliability and validity of constructs

Constructs	Items	Factor load	Composite Reliability	AVE
Technology Readiness	TR2	0.771	0.807	0.583
	TR3	0.713		
	TR4	0.804		
Adoption Cost	AC1	0.794	0.820	0.604
	AC2	0.797		
	AC3	0.739		
Government Support	GS1	0.805	0.785	0.480
	GS2	0.693		
	GS3	0.625		
	GS4	0.635		
Use of E-commerce	UOEC1	0.548	0.813	0.386
	UOEC2	0.655		
	UOEC3	0.506		
	UOEC4	0.710		
	UOEC5	0.596		
	UOEC6	0.605		
	UOEC7	0.701		
Innovative Performance	IP1	0.795	0.802	0.509
	IP2	0.729		
	IP3	0.764		
	IP4	0.537		
E-commerce Marketing Capabilities	ECMC1	0.525	0.794	0.444
	ECMC2	0.779		

ECMC3	0.751
ECMC4	0.722
ECMC5	0.502

Discriminate Validity:

The discriminating validity was investigated using the criteria proposed by Fornell and Larcker. It is "the degree to which the constructs empirically diverge from one another." The findings above demonstrate that, by Fornell and Larker's criteria for discriminating validity, those constructs do not reflect a comparable occurrence [46]. Therefore, as shown in Table 3, the square root of AVE is greater than the correlation between latent variables.

Table 3: Discriminate Validity matrix

	AC	ECMC	GS	IP	IR	UOEC
AC	0.777					
ECMC	0.965	0.666				
GS	0.454	0.561	0.693			
IP	0.978	0.967	0.581	0.713		
TR	0.487	0.619	0.494	0.516	0.764	
UOEC	0.592	0.733	0.677	0.642	0.879	0.621

Assessment of Structural Model:

According to Table 5, one out of every five hypotheses is not supported by the 0.05 standard p-value. The t-value and p-value are presented in the structural model along with the relationships' direct consequences to demonstrate the significance of the hypotheses. To explore the indirect (mediation) relationship between e-commerce and endogenous and exogenous factors, the study used a bootstrapping methodology, as shown in Figure 4.

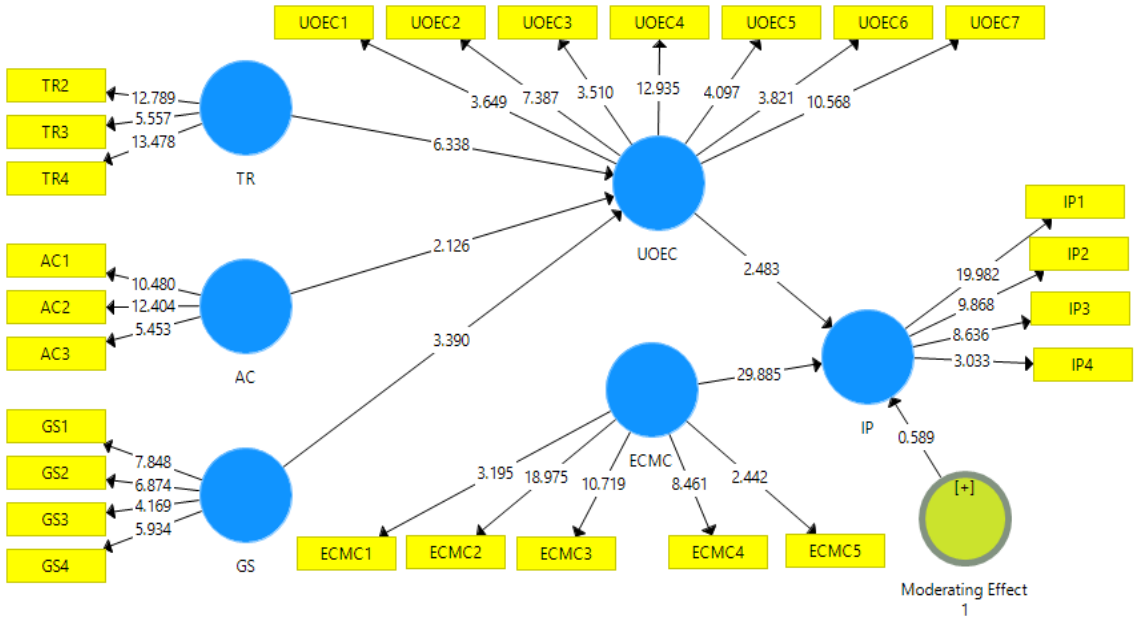

Figure 4: Analysis Model

Source: From Smart PLS 3.3.2 analysis following the inclusion of the moderator (ECMC), shows the factor loading values of contacts and β value of relations between contacts.

Path Analysis:

Table 4: Path analysis assessment

	R Square	Adjusted R Square	Assessment
IP	0.945	0.943	Strong
UOEC	0.864	0.860	Strong

Hypothesis Testing Results (Direct Relations):

Table 5: Hypothesis testing Results (Direct Relations)

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (|O/STERR|)	P Values
AC -> UOEC	0.135	0.128	0.062	2.187	0.029
GS -> UOEC	0.283	0.264	0.088	3.206	0.001
TR-> UOEC	0.674	0.696	0.111	6.084	0.000
UOEC-> IP	-0.154	-0.135	0.063	2.431	0.015

Figure 4 and Table 5 reveal a connection between AC and UOEC of (=2.126, P0.05, t>1.96), Hypothesis H3 is acceptable. The relationship between GS and UOEC (=3.390, P 0.05, t > 1.96), which supports Hypothesis H5. H1 appears to be valid, supported by the significant association between TR and UOEC ($t = 6.338$, $p < 0.05$, t-value > 1.96). Similarly, it is likely that H7 can be accepted, as there seems to be a link between UOEC and IP ($t = 2.483$, $p < 0.05$, t-value > 1.96). **Hypothesis Testing Results (Mediating Relations):**

Table 6: Total effect

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (|O/STERR|)	P Values
GS ->IP	-0.043	-0.037	0.022	1.998	0.046
AC ->IP	-0.021	-0.018	0.011	1.822	0.069
TR-> IP	-0.103	-0.091	0.043	2.405	0.017

Table 7: Hypothesis testing results (Mediating Relations)

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (|O/STERR|)	P Values
GS -> UOEC->IP	-0.043	-0.037	0.022	1.998	0.046
AC -> UOEC->IP	-0.021	-0.018	0.011	1.822	0.069
TR-> UOEC-> IP	-0.103	-0.091	0.043	2.405	0.017

As per the data presented in Table 5, the mediation relationship involving UOEC between GS and IP shows statistical significance with a p-value less than 0.05 and a t-value exceeding 1.96. Therefore, the H6 is appropriate. A good working relationship exists between GS and UOEC, as well as between UOEC, IP, and GS. IP and UOEC act as helpful mediators between GC and IP. There is complementary (partial) UOEC mediation between GC and IP.

Even though there is a negative correlation between AC and UOEC, H3 was validated for the examination of H4. UOEC is demonstrated to have a positive impact on IP. However, there is no direct association between AC and IP ($p > 0.05$ and $t < 1.96$). Instead, there appears to be an indirect relationship, indicating complete mediation. As a result, H4 is approved. Regarding the testing of H2, there is a significant interaction between TR and UOEC. According to Table 6 ($p<0.05$ & $t > 1.96$), there is a strong correlation between UOEC and TR and IP. These correlations are both significant. As a result, TR and IP are subject to complementary (partial) UOEC mediation.

Hypothesis testing Results (Moderating Relations):

Table 8: Hypothesis testing results (Moderating Relations)

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (|O/STERR|)	P Values
UOEC* ECMC->IP	-0.010	-0.010	0.015	0.638	0.524

According to Table 8, there is no moderating relationship of ECMC between UOEC and IP (i.e. $t<1.96$ and $p>0.05$) therefore H8 is rejected.

Conclusion:

The findings indicate that the technological component, or technological preparedness, has a positive influence on the UOEC. Similarly, environmental factors (GS) dramatically boost e-commerce usage. An organizational factor that hinders the usage of e-commerce is adoption

expenses. The adoption of e-commerce has a positive effect on the innovation performance of SMEs. These results support the resource-based hypothesis and align with the study's aim, which was to find out how organizational, technological, and environmental factors influence the use of e-commerce. Diffusion theory supports the fact that the adoption of e-commerce has a positive effect on SME's innovative performance.

The UOEC has a complementary (partial mediation) link to technological preparedness and innovative performance. Government funding and innovative performance can also be mutually supportive (partial mediation). The use of e-commerce to fully mediate the relationship between adoption costs and the creativity of SMEs only has an indirect relationship, however.

The ability of SMEs to access the e-commerce market has no moderating effect, even though there is a significant association between the usage of e-commerce and innovative performance. This study aims to ascertain how Pakistan's high-performing, innovative SMEs use and engage with the e-commerce market. The conclusions of this study regarding innovative performance, particularly in the case of SMEs, are supported by other studies [47][48].

Given the substantial direct and indirect links with the UOEC, SME managers should also consider the availability of various types of resources (independent variables) before implementing them in their businesses. As a result, this study has tried to outline the essential components and competencies required to change the company's traditional operating model to one based on brick-and-mortar and e-commerce.

Discussion:

The main objective is to determine the influence of TOE contextual factors on e-commerce adoption and usage. The outcome section explores explicitly the connections between technological, organizational, and environmental elements and the adoption of e-commerce, which addresses this purpose. Most of the TOE components associated with this purpose are technological and environmental (e.g., TR, AC, GS). The results reveal a positive association between technological readiness and the utilization of e-commerce. However, feelings of discomfort and apprehension can hinder technology adoption preparation, as individuals may express both positive and negative sentiments regarding it. As a result of its significance, the discipline of computer science needs to concentrate on technology readiness for Pakistani SMEs to adopt technological trends (such as the UOEC). Utilizing technology to enhance performance and drive innovation is a prerequisite for digital technology readiness to facilitate digital transformation [33][49][50]. Adoption costs, an organizational element, have a negative impact on the UOEC, whereas GS, an environmental factor, has a favorable impact. The TOE framework has also been widely applied as a theory to examine how well SMEs embrace new technologies [51]. Additionally, TOE has established itself as the preferred framework for analyzing technology adoption [52].

The second objective investigates the extent to which e-commerce utilization acts as a mediator in the connection between TOE characteristics and the innovative performance of SMEs. The discussion of how UOEC mediates the relationship between adoption costs and innovative performance in the results section directly addresses this purpose and has full mediation. AC is essential for the adoption of any new technology. Similarly, To create a better framework for understanding and forecasting technological adoption and/or the intention to use technology (such as intelligence conversational agents and chatbots-AI technology) among SMEs, incorporates perceived technology security and UTUAT constructs into the TOE framework. Findings on business intelligence systems and e-business adoption among SMEs also show adoption costs to be negligible [53][54]. The UOEC has complementary partial mediation between the TOE factors (i.e. technological (TR), organizational (such as AC)) and innovative performance in the context of SMEs of Pakistan.

The third objective explores how the innovation capability and e-commerce adoption of SMEs may be impacted by the ECMC. According to [55] the development of resources and

marketing abilities that support businesses performance in a developing market is important. Similarly, social media marketing communication capability was found to have a significantly positive relationship only with customer relationship performance [56]. Similar to this, suggested that marketing competencies in the form of mixed decisions about new products will work to boost the favorable benefits of orientation on innovation performance. The moderating impact of market capacities on the use of e-commerce and innovative performance is examined in this study. The conclusion regarding this relationship is dismissed. There is no moderating connection between the utilization of e-commerce and the innovative performance of SMEs.

Importance of Research in Computer Science Context:

In the realm of computer science, this research holds significant importance as it highlights the connection between various elements of TOE and the UOEC. These elements encompass technological aspects (like TR and UOEC), organizational factors (including AC and UOEC), and environmental factors (such as GS and UOEC), all of which collectively impact the innovative performance of SMEs. Additionally, the study considers the moderating influence of market capability in this relationship. This is important to computer science because of the following reasons:

Digital Transformation:

Computer science is a key component of the digital transformation, SMEs can use e-commerce to enhance their performance in terms of innovation. Many companies use their website to revamp internal computer science department systems and reconsider administrative organizational techniques. One of the goals of SMEs is to increase turnover, market share, and sales. Other goals of SMEs include improving interactions with internal partners (processes/organization), improving interactions with external partners (customers/suppliers), and improving interactions with customers.

Resource Allocation:

The study emphasizes the need to take into account different resources before implementing e-commerce in SMEs. This information will be useful for businesses and computer science professionals as they allocate funds and budget for digital initiatives.

E-commerce Development:

The study of the factors affecting e-commerce adoption can be useful to computer scientists and developers. The development of e-commerce platforms and technologies that are more adapted to the needs of SMEs might be guided by the information provided.

Innovation:

New techniques and concepts are continually being developed in computer science. Understanding how technology adoption and e-commerce usage affect innovation in SMEs might help computer science specialists develop cutting-edge tools and solutions for small businesses.

Limitations and Future Directions:

This study offers suggestions for future research avenues, which may encompass investigating innovation and exploring the possibilities within the innovative market. This highlights potential paths for computer science to expand knowledge and strengthen the relationship between technology, e-commerce, and innovation.

The findings of this study will specifically apply to SMEs operating in Pakistan's major cities. If the scope of this research is broadened, similar research can be conducted using the same theoretical underpinnings in other regions of Pakistan and other emerging nations. The study can be useful for SMEs in the retail and service sectors. The theoretical foundations of the TOE model and dynamic capability theory can be harnessed in prospective academic studies to scrutinize the role of innovation and how innovative market capabilities act as mediating factors.

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