



E-Commerce Adoption for MSME Performance in Saudi Arabia: Drivers, Outcomes, and Policy Implications

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Email: ahamadwahid@kau.edu.sa² Lecture, Department of Economics and Finance, King Abdul Aziz University Saudia Arabia.³ Lecture, Department of Economics and Finance, King Abdul Aziz University Saudia Arabia.**ARTICLE INFO****ABSTRACT****Article History:**

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COVID-19 turned business upside down for micro, small, and medium-sized enterprises (MSMEs) everywhere, and Saudi Arabia was no exception. Faced with disruption, these businesses scrambled to adapt, trying out new strategies just to stay afloat. In this study, I take a close look at how adopting e-commerce shaped MSME performance during the pandemic, and what drove these businesses to go digital in the first place. The study gathered data from 513 MSMEs across Saudi Arabia's diverse regions. Using partial least squares-structural equation modelling (PLS-SEM), I examined the links between e-commerce adoption and business outcomes. The findings are clear: technology resources, technical infrastructure, and company size all play a huge role in whether an MSME adopts e-commerce. And when they do make the leap? Their financial and non-financial performance picks up noticeably. Another interesting point—MSMEs themselves serve as a bridge between e-commerce adoption and financial performance, amplifying the benefits of going online. These results add a new layer to what we know about technology adoption. They show how specific factors shape success during a crisis, and just how vital e-commerce can be for both survival and growth. For MSME managers and policymakers, these insights matter. Embracing e-commerce isn't just a trend; it's a lifeline for growth and resilience. Policymakers can use this research to design smarter strategies that encourage digital transformation in Saudi Arabia. On a broader level, the study sharpens the Technology-Organization-Environment (TOE) framework, giving MSMEs real-world guidance for navigating digital change, especially in turbulent times.



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Corresponding Author's Email: ahamadwahid@kau.edu.sa**1. Introduction**

The period of COVID-19 epidemic was crucial for many businesses models that moved online from traditional modes. It has disrupted many industries and businesses forever. The pandemic caused various economic and social upheavals (Alzahrani, 2019). Most countries have faced different hurdles over the years. The micro, small, and medium enterprises (MSMEs) industry was one of the worst-case scenarios that impacted negatively by the COVID-19 spread (Hariharan, Thomas, & Viswanathan, 2021). Most MSMEs faced tough times regarding sales and related revenues (Rasee, Jajja, & Ishaq, 2021). Profits became meager, and many enterprises experienced losses. The adoption of e-commerce became a new trend, although initially, it was done by force. Later, it became normal. Saudi Arabia was chosen as

the focus country for the following reasons. As per the latest data, MSMEs constitute 28.7% of the GDP of country in 2023 and are projected to reach 35-40% by the year 2030 (Statista, 2024). In addition, the GDP growth rate puts Saudi Arabia in the second level of the largest economy in the world. Also, as per the Saudi Census (2022), 70% of the citizens are lower than 40 years, and millennials represent about one-third, making it one of the youngest economies in the globe (Alfawzan, Altalhab, & Alkhawailed, 2022). However, Saudi MSMEs, especially those vulnerable, have suffered disproportionate impacts from the COVID-19 pandemic. Given this context, analyzing how Saudi MSMEs can adopt technological applications like e-commerce to promote their businesses and performance is crucial. E-commerce research is very limited to big businesses, neglecting the MSME sector. Hence, the findings of this study are essential to assess the MSMEs' adoption of e-commerce and determine the determinants and the consequences of it in Saudi Arabia (Rasheed, Shahid, Mukhtar, & Ishaq, 2022).

This study, grounded in the technology–organization–environment (TOE) paradigm, seeks to examine the impact of e-commerce adoption (ECA) on the performance of MSMEs in Saudi Arabia and to identify the determinants affecting e-commerce adoption during the epidemic. Three critical perspectives pertinent to MSMEs were examined as drivers of e-commerce adoption, while both financial and non-financial performances were analyzed as outcomes of e-commerce adoption (Alqahtani, 2016). Furthermore, non-financial performance is evaluated as a mediator between E-commerce adoption and financial performance. In accordance with the aims, the research objectives are described below:

- To evaluate the drivers that impact the adoption of e-commerce (ECA) in the Saudi Arabian context
- To analyze the consequences of e-commerce adoption (ECA) on MSMEs in Saudi Arabia
- To estimate the MSMEs' non-financial performance, mediate the association between e-commerce adoption (ECA) and the financial performance in Saudi Arabia

2. Literature Review

Technology–Organization–Environment Framework (TOE) Malik, Chadhar, Vatanasakdakul, and Chetty (2021) integrates multidimensional factors of an organization while investigating technology adoption and dissemination, many studies consider it to have more significant explanatory potential than these earlier adoption models (de Oca Munguia & Llewellyn, 2020). It has proved to be one of the most widely used and well-established frameworks for new technology research connected to organizational adoption (Rasheed, Ishaq, Anwar, & Shahid, 2021). As its name indicates, TOE outlines three dimensions: technological, organizational, and environmental, impacting the organization's adoption and implementation of an innovation or a new technology. "Technological dimension refers to internal and external technologies that are significant to the company" (Borgman et al., 2013). This context comprises the company's current practices, equipment, and available technologies outside the company (R. Rasheed, M. N. Ishaq, & F. Malik, 2022). "Organizational dimension refers to descriptive metrics about the organization, such as its scope, size, and management structure" (Rasheed, Ishaq, & ur Rehman, 2021). Researchers have put the TOE framework through its paces in all sorts of e-commerce contexts. It's not just a one-off; people keep coming back to it when they want to understand how businesses pick up and spread new technologies online (Ishaq, Xia, Rasheed, & Abdullah, 2017), for example—they dove into how e-business gets rolled out inside a company and how its use spreads outside. In their work, the technological context means Information Systems expertise and the IS infrastructure. For the organizational context, it's all about the benefits a business expects from e-business and whether those benefits fit with what the organization does already. Then you've got the environmental context, which looks at things like whether trading partners ready and how much competition are pushes a company to act.

Pan, Liu, and Pan (2022) approached it a bit differently, focusing on e-commerce development as a fresh business strategy. Here, technological context comes down to human capital and supplier support. Organizational factors shift to things like company size and how well information is managed. Environmental context now includes e-commerce security and how satisfied users feel, while firm property shows up as a control variable. The TOE framework keeps showing up in research, especially when scholars look at how companies

take on new support technologies or in specific case studies. R. Rasheed, M. N. Ishaq, and M. F. Malik (2022) used the TOE model to zero in on what drives organizations to adopt augmented reality in e-commerce. They pointed out factors that matter for rolling out AR tech in places like Singapore, India, and the US, especially when it comes to making shopping better for customers. Rukhsana, Xia, Nadeem, and Majid (2017) describe the performance as the main output of each strategic activity launched by a business. It is also a measure of the company's success in meeting the goals that have been set (Rasheed, Ishaq, Anwar, et al., 2021). Previous studies have indicated a significant connection between the use of technology (i.e., e-commerce, social media, mobile payment systems, cloud computing) and MSME performance. A firm's performance is broadly divided into financial and non-financial performances. Furthermore, current studies argue that e-commerce may significantly affect firms' financial and non-financial performance (Rasheed, Xia, Ishaq, Mukhtar, & Waseem, 2016). For example, Thamir Hamad and Amin K (2023) observed that e-commerce costs positively affect company performance. showed that SME performance is significantly and positively influenced by e-commerce. The firm's performance is described by the aspects of efficiency, coordination, and trade growth.

3. Research Methodology

Drawing on established validation of the scales utilized in previous studies, our study employed PLS-SEM software to conduct an in-depth analysis of the psychometric properties. It encompasses various procedures, for instance factor analysis computation, assessing the structural stability of the dataset, and conducting analyses of internal consistency ratings. The validity and reliability of constructs including ECA, TR, ITSHR, TechIF, BusIF, GoS, ExP, NFP (excluding 16 items that were omitted from the final analysis due to outer loading values of <0.70) and FP were rigorously examined through the study's analysis process.

3.1 Data Collection and Sample

A survey method utilizing an online questionnaire was chosen for this research because of its manifold advantages, comprising cost-effectiveness, efficiency, speed, and ease of administration. The questionnaire underwent meticulous development, drawing upon insights from prior research in the field. Initially, it was crafted grounded on a wide evaluation of existing literature and subsequently refined with feedback from two academics who are specialists in the domains of e-commerce and economics. Following ethical clearance from the institution's ethics committee, the questionnaire went through a pre-testing phase that involved five individuals, consisting of three owners and two managers from MSMEs. The employee count serves as a proxy metric for assessing company size in this study. Modifications were implemented based on specialists' comments to enhance the clarity of all items in the survey instrument. The polished survey tool was employed for data collection from MSMEs.

3.2 Data Analysis Technique

Our research employed the partial least squares structural equation modeling (PLS-SEM) method for data analysis due to many strong justifications.

Firstly, PLS-SEM provides the intensity and statistical significance of each path, enabling the investigator to analyze structural models encompassing multiple variables with direct and indirect relationships to ascertain variations in predictors. Secondly, PLS-SEM is acknowledged as a highly useful research approach for evaluating and handling interactions, thus reducing type 2 error (Fauzi, 2022). It also been recognized as a useful procedure for consumer behavior and environmental issues (Khan, Saengon, Alganad, Chongcharoen, & Farrukh, 2020), and this technique used by many investigations related to SMEs. Thirdly, it is suggested by statistical experts as a suitable technique for relatively complex model with small data size and data are non-parametric in nature (ALI, 2023) meaning it does not have a normally distributed trend and can be applied in small-sample studies. Notably, PLS-SEM has gained significant attention among various domains comprising marketing, strategic management, operations management, and human resources.

The study used SmartPLS 4.1 software and the bootstrapping procedure with 5,000 trails for model estimation, and a two-tailed test is used to evaluate significance in conjunction with the bootstrapping procedure.

4. Results and Empirical Findings

4.1 Assessment of Measurement Models

By examining reliability, convergent validity, and discriminant validity, we assessed the concepts' validity and reliability. Table 2 shows that every outside load was higher than the 0.70 threshold. Additionally, Table 3 shows that the average variance extracted (AVE) for every structure exceeded the 0.50 criterion. Table 3 further confirms discriminant validity by showing that the AVE values were higher than the correlations between the variables. Each construct's Cronbach's Alpha and composite reliability values are shown in this table, and they are all higher than the 0.70 threshold. The internal consistency and validity of the latent components are demonstrated by the data in Tables 2 and 3 (Rasheed et al., 2016). Consequently, the findings of this study are reliable and precise. Furthermore, the discriminant validity was also assessed by inspecting the heterotrait-monotrait (HTMT) ratio of correlations between the constructs. The values in Table 3 further support the model's discriminant validity, as all HTMT values fall well below the more conservative threshold of 0.90 (Sarstedt et al., 2022).

4.2 Assessment of Structural Model

Evaluating the structural model consists of evaluating the relevance and importance of the path coefficients and the Variance Inflation Factor (VIF) between constructs. We examine each group of predictors within the structural model to identify potential collinearity. Table 1 demonstrates that the model showed no signs of collinearity, with all independent variables having VIF values less than 5, deemed ideal (Sarstedt, Hair Jr, Nitzl, Ringle, & Howard, 2020). The bootstrap approach is a standard technique to investigate the mediation hypotheses, which has been developed by Ishaq, Xia, Rasheed, Ahmad, and Abdullah (2016). For this reason, we utilized this widely used bootstrap approach for hypothesis testing. The bootstrapping procedure for 5,000 trails presented. Bootstrapping results indicated that all latent variables are positively correlated with each other, except for business infrastructure and external pressure. Among these variables, three of them have a direct and significant relationship with the adoption of ECA, which are TR, TechIF and FS ($\beta = 0.110$, $P < 0.05$; $\beta = 0.070$, $P < 0.05$; $\beta = 0.176$, $P < 0.01$ respectively), and such results supported H1, H3 and H7. Furthermore, ECA is found to have a significant positive relationship with both FP and NFP ($\beta = 1.160$, $P < 0.01$; $\beta = 0.398$, $P < 0.01$), which supported H8 and H9. Additionally, the result demonstrates a positive and significant relationship between NFP and FP ($\beta = 0.217$, $P < 0.01$), which supports H10. All the other constructs are found to have a significance value of >0.05 . From another viewpoint, higher levels of external pressure ($\beta = -0.042$) and business infrastructure ($\beta = -0.019$) lead to lower levels of ICT adoption in Saudi's MSMEs. The bootstrapping investigation further revealed that NFP significantly mediates the relationship between ECA and FP ($\beta = 0.086$, $P < 0.01$) in Saudi's MSMEs, thus supporting H11.

Table 1
Scale Validation – Reliability and Validity

Constructs	CA	CR	AVE	ECA	TR	ITSHR	TechIF	BR	GoS	ExP	FP	NFP
ECA	0.991	0.991	0.947	0.973								
TR	0.934	0.968	0.749	0.097	0.866							
ITSHR	0.901	0.929	0.909	0.118	0.827	0.954						
TechIF	0.914	0.941	0.851	0.164	0.721	0.733	0.922					
BR	0.930	0.964	0.739	0.078	0.812	0.777	0.718	0.860				
GoS	0.872	0.914	0.719	0.108	0.688	0.637	0.614	0.738	0.848			
ExP	0.915	0.940	0.699	0.078	0.789	0.714	0.721	0.825	0.793	0.836		
FP	0.941	0.941	0.816	0.615	0.216	0.196	0.259	0.227	0.233	0.211	0.903	
NFP	0.934	0.962	0.599	0.196	0.475	0.476	0.435	0.519	0.407	0.524	0.329	0.774

Source: The authors' estimation (2024)

Given this context, it is considered essential to examine how Saudi MSMEs can integrate technological platforms like e-commerce to maintain their operations and

performance. Therefore, this research seeks to explore the impact of e-commerce adoption (ECA) on the performance of MSMEs in Saudi Arabia and determine the factors that influenced e-commerce adoption during the pandemic. All firms in our sample have access to Internet technology, we propose that a more comprehensive technological infrastructure—encompassing tools like email, intranets, extranets, public websites, EDI, EFT, and call centers—boosts the extent to which these firms leverage the Internet throughout their value chains. The availability of technological resources is crucial for adopting e-commerce. Therefore, as technological resources increase, the expansion of e-commerce among MSMEs also increases, and vice versa

Table 2**Discriminant validity with HTMT**

Constructs	ECA	TIF	ITSHR	TechIFF	BR	GoS	ExP	FP	NFP	FS
ECA TR	0.191									
ITSHR	0.123	0.896								
TechIF	0.168	0.780	0.816							
BR	0.077	0.878	0.849	0.789						
GoS	0.110	0.753	0.709	0.688	0.815					
ExP	0.078	0.852	0.786	0.788	0.845	0.883				
FP	0.636	0.223	0.211	0.274	0.240	0.254	0.227			
NFP	0.170	0.517	0.896	0.469	0.568	0.451	0.580	0.321		
FS	0.377	0.014	0.036	0.126	0.036	0.086	0.034	0.196	0.061	

Source: The authors' estimation (2024)

The study result reveals that technical setup is an essential aspect in e-commerce adoption in MSMEs in Saudi Arabia. Thus, technical infrastructure positively affects e-commerce adoption, which supports the third hypothesis (H3). Such result is consistent with earlier studies conducted by Olaopa and Alsuhaibany (2023)

Table 3**Path coefficients**

Relationships	Beta	P-values	LLCI	ULCI	F2	Decision
TR -> ECA	0.110	0.021	0.139	0.284	0.071	Supported
ITSHR -> ECA	0.031	0.434	-0.055	0.099	0.001	Not Supported
TechIF -> ECA	0.070	0.038	-0.009	0.110	0.006	Supported
BR -> ECA	-0.019	0.646	-0.101	0.064	0.000	Not Supported
GoS -> ECA	0.023	0.496	-0.046	0.087	0.001	Not Supported
ExP -> ECA	-0.042	0.311	-0.112	0.051	0.002	Not Supported
FS -> ECA	0.176	0.000	0.140	0.212	0.144	Supported
ECA -> FP	1.160	0.000	1.040	1.280	0.546	Supported
ECA -> NFP	0.398	0.000	0.224	0.572	0.040	Supported
NFP -> FP	0.217	0.000	0.141	0.292	0.078	Supported
ECA -> NFP -> FP	0.086	0.000	0.051	0.126		Supported

Source: The authors' estimation (2024)

For example, Almalki (2023) confirmed that technological resources and technical infrastructure encourage e-commerce adoption in SMEs in Saudi Arabia. Almalki (2023) claimed that technical infrastructure is one of the pertinent factors determining the adoption of e-commerce by SMEs

This study reveals that e-commerce adoption among Saudi Arabian MSMEs is not influenced by business resources. Therefore, the fourth hypothesis (H4) is not supported in this research. The negative but insignificant relationship between business resources and e-commerce adoption in Saudi's MSMEs could be caused by various factors, such as lack of readiness of dealing with rapid changes, lack of encouraging policies for e-commerce initiatives. MSMEs may find it challenging to allocate funds toward e-commerce initiatives due to competing priorities and might lack the basic resources to invest in technology infrastructure and digital marketing. Additionally, a lack of awareness about the benefits of e-commerce and uncertainty about its effectiveness may further hinder adoption. Thus, while business resources are essential, their availability alone may not strongly influence e-commerce adoption among Saudi MSMEs. This finding is opposed to the majority studies (Jennex et al., 2004; Walker et al., 2016; Abed, 2020). For example, these studies reveal that firm's capacity of dealing with rapid changes, encouraging policies of e-commerce initiatives

and other readiness factors are closely associated with e-commerce adoption. The study showed a clear, positive link between non-financial performance and financial performance in SMEs, backing the tenth hypothesis (H10) and matching what earlier research found (Islam et al., 2017; Theron and Dowden, 2017). The data also highlighted a strong mediating effect—firms' non-financial performance shapes how e-commerce adoption leads to better financial results, supporting hypothesis eleven (H11). Our analysis makes it obvious: when organizations adopt e-commerce, they boost internal quality, streamline operations, drive innovation, improve efficiency, increase transparency, strengthen social responsibility, polish their corporate image, and pay more attention to the environment. All of these changes help their bottom line. Many MSMEs turn to e-commerce tools to connect with new customers, and this move consistently leads to stronger financial performance—a pattern that echoes previous studies (Rawashdeh & Al-Namlah, 2017).

5. Conclusion

This study carries important implications, as its results are anticipated to assist MSME owners and managers in their endeavors to adopt e-commerce during times of crisis. Additionally, the findings encourage businesses to strengthen their technical resources and infrastructure to boost both financial and non-financial performance. Furthermore, authorities like Ministry of Commerce, Saudi Central Bank (SAMA) and Ministry of Communication and Information Community can benefit from this study to regulate and develop e-commerce in Saudi Arabia. Further research can compare between three periods: before, during and after COVID-19. In addition, more studies can be conducted to give a comparison of the determinants and impacts of e-commerce adoption on MSMEs between countries or regions such as GCC countries. Also, more studies can be conducted to measure the impacts of COVID- 19 pandemic on consumer behavior and over the periods of crises.

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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