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# The Effect of E-Commerce and Digital Marketing Adoption on Financial Performance and Sustainability in MSMEs During the COVID-19 Pandemic: An Empirical Analysis

Ali Raza
MS Scholar, Department of Management Sciences,
IQRA National University, Peshawar. Email: aliraza8@gmail.com

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**Abstract**

The pandemic accelerated digital transformation, leaving MSMEs no option but to adapt to using e-commerce and online marketing to conduct operations. This article explores how the economic stability and viability of Pakistani-based micro, small, and medium enterprises have been compromised by the move to use e-commerce (ECA) and digital marketing (DMA) during the pandemic. The study is grounded in Resource-Based View (RBV) theory and hypothesizes and tests an intermediate-level of abstraction conceptual model between ECA and DMA and financial performance and sustainability where financial performance mediates the relationship between financial performance and sustainability as per the conceptual model. The questionnaire was a directed one as it was used in the gathering of data on 212 managers of MSMEs in the wholesale/retail or pharmacy, restaurants and electronic industry. Partial Least Squares Structural Equation Modeling (PLS-SEM) has been applied to analyse the data. The results mean that ECA and DMA show the significant positive influence on financial performance. The real impact of ECA is a positive effect of sustainability but this is not the case with DMA. It is however observed that neither ECA nor DMA and sustainability are related without the involvement of financial performance. This reveals that digital marketing does not stand alone in its contribution to sustainability given its ability to improve the financial wellness levels; e-commerce also plays a part albeit through direct and indirect contributions. The work provides empirical discussions as to how the digital technology adoption contributes to resilience and long-term survival in the MSMEs in two ways. It provides pragmatic studying to the managers and policymakers concerned with the digitalization of emerging economies and adoption of business sustainability.

**Keywords:** E-commerce, digital marketing, performance, sustainability, MSMEs, PLS-SEM.

## 1. Introduction

Electronic commerce (e-commerce) has emerged as a transformative force in the global business landscape, enabling firms to expand market reach, reduce operational costs, respond to external disruptions, and enhance customer engagement (Udayana et al., 2023). The digital shift has compelled organizations across sectors to establish an online presence and leverage internet-based platforms to remain competitive. The rapid evolution of e-commerce has redefined consumer interaction models, accelerating the decline of traditional brick-and-mortar retail and reshaping supply chain dynamics (Pundir et al., 2024). Research indicates that e-commerce adoption (ECA) significantly influences transaction efficiency, delivery responsiveness, customer satisfaction, and overall firm performance in the digital economy (Asawawibul et al., 2025). However, sustaining a competitive advantage remains challenging in an environment where product commoditization

and rapid imitation are facilitated by widespread access to competitor data. Despite the global proliferation of e-commerce, a persistent digital divide exists between large enterprises and micro, small, and medium-sized enterprises (MSMEs) (Rachbini et al., 2023). While MSMEs increasingly adopt information and communication technologies (ICT) to gain market visibility and competitive leverage, their digital integration remains inconsistent. Both consumers and businesses benefit from e-commerce adoption (Hendricks & Mwapwele, 2024), with MSMEs standing to gain significantly in terms of market access and operational efficiency. Yet, scholarly attention on ECA within MSMEs remains limited (Wirdiyanti et al., 2023), & implementation rates lag behind those of larger firms, which have more readily captured benefits such as increased sales and cost optimization. The onset of the COVID-19 pandemic, however, acted as a catalyst for digital transformation among MSMEs, compelling many to adopt e-commerce platforms to sustain operations and maintain revenue streams (Gao et al., 2023). As physical mobility and in-person transactions were restricted, businesses rapidly migrated online. This raises a critical research question: to what extent has ECA enhanced the financial and sustainability performance of MSMEs during the pandemic?

Concurrently, the rise of digital marketing (DM) has revolutionized promotional strategies, with businesses leveraging data analytics, social media, and search engine optimization to enhance brand visibility, customer acquisition, and market penetration (Theodorakopoulos & Theodoropoulou, 2024). While large firms have extensively adopted digital marketing strategies, MSMEs often face barriers such as limited digital skills, budget constraints, and a lack of strategic orientation. Although DM has proven effective in expanding customer bases and improving brand recognition for small businesses (Mulyani & Hermina, 2023), research on digital marketing adoption (DMA) in MSMEs—particularly its impact on financial and sustainability outcomes-remains scarce. Much of the existing literature focuses on consumer behavior and campaign effectiveness (Theodorakopoulos & Theodoropoulou, 2024), leaving a gap in understanding how DMA directly influences organizational performance. This study addresses this gap by examining the direct and indirect effects of DMA on the financial outcomes and long-term sustainability of MSMEs.

In Pakistan, MSMEs play a pivotal role in economic development, contributing approximately 25% to GDP and supporting over 39 million livelihoods directly and indirectly (Zada et al., 2021). Despite their economic significance, MSMEs face systemic challenges, including limited access to finance, weak market linkages, skill shortages, and underdeveloped export channels (Mer & Virdi, 2024). In this context, digital transformation has been increasingly advocated as a resilience strategy to mitigate operational disruptions and ensure business continuity (Hokmabadi et al., 2024). Scholars emphasize that digital adoption—particularly in e-commerce, digital marketing, and online logistics—can enhance organizational agility and crisis response. (Hendrawan et al., 2024) highlight that digital integration enables MSMEs to monitor operations, manage inventories, access financial data, and optimize value chains. By transitioning to digital Platforms, firms can build sustainable business models grounded in real-time data and strategic insights. decision-making.

Moreover, consumer behavior has undergone a significant shift, with a growing preference for online shopping, especially during lockdowns and mobility restrictions (Septiano, WP, Fauzi, Suratman, & Chatra, 2024). This behavioral change accelerated e-commerce growth, with online sales in Pakistan surging by 70–80% in early 2020 (Gao et al., 2023). Marketing teams, facing budget cuts and remote operations, have prioritized digital channels to achieve measurable returns on investment (Alwan et al., 2023). Despite this momentum, no empirical study has examined how ECA and DMA have influenced the financial performance and sustainability of Pakistani MSMEs during the pandemic. This research fills that gap by analyzing the role of digital adoption in enhancing MSME resilience.

This study contributes to the literature in four key ways. First, it applies the resource-based view (RBV) to explain how e-commerce and digital marketing serve as strategic resources that enhance performance and sustainability in resource-constrained environments (Alwan et al., 2023). Second, it provides empirical insights into the adoption patterns of EC and DM among MSMEs in an emerging economy, highlighting their role in crisis adaptation. Third, it establishes direct relationships between ECA and financial performance, ECA and sustainability, and DMA and performance, offering actionable insights for managers and policymakers (Chandio et al., 2024). Finally, it demonstrates the mediating role of financial performance in the pathways linking ECA and DMA to sustainability, reinforcing the idea that digital adoption drives sustainability through improved financial health.

## 2. Literature Review

### 2.1. Theoretical Framework and Hypothesis Development

The Resource-Based View (RBV) serves as a foundational lens for understanding how firms achieve competitive advantage through the strategic deployment of unique, valuable, and difficult-to-imitate resources and capabilities (Kero & Bogale, 2023). RBV posits that a firm's internal resources—when bundled and leveraged effectively—generate heterogeneous performance outcomes across organizations. According to Barney et al. (2021), Sustainable competitive advantage arises when resources are valuable, rare, inimitable, and non-substitutable (VRIN). In the context of digital transformation, e-commerce and digital marketing capabilities can be conceptualized as strategic assets that align with VRIN criteria, particularly when integrated into a firm's core operations in a way that competitors cannot easily replicate. Recent studies affirm that digital competencies, such as online sales infrastructure and data-driven marketing, function as critical organizational resources that enhance performance and resilience, especially in volatile environments (Hokmabadi et al., 2024).

E-commerce adoption (ECA) enables firms to optimize internal processes, reduce transaction costs, and expand market reach—functions that directly contribute to financial performance. From an RBV perspective, the development of a robust e-commerce platform constitutes a firm-specific capability that, once embedded, becomes a source of economic rent. (Turki et al., 2023) highlight that digital assets like customer databases, online transaction histories, and integrated supply chain systems are often non-transferable and hard to duplicate, reinforcing their strategic value. Furthermore, digital marketing adoption (DMA) can be viewed as a dynamic capability that allows

firms to respond swiftly to market changes, personalize customer engagement, and amplify brand visibility—factors that strengthen long-term competitiveness (Douros, Papageorgiou, Milioris, Panagiotakopoulou, & Kaldis, 2023). This study draws on RBV to examine how ECA and DMA serve as strategic enablers of both financial performance and sustainability in MSMEs during the post-pandemic recovery phase.

### 2.1. E-Commerce Adoption and Firm Performance

While definitions of e-commerce vary, it is broadly understood as the electronic exchange of goods, services, and information via digital networks, particularly the internet. In the MSME context, e-commerce functions not only as a sales channel but as a transformative tool that redefines operational efficiency and market access. Empirical evidence consistently supports a positive association between technological innovation and organizational outcomes, with e-commerce emerging as a key driver of performance enhancement (Hussain et al., 2020). For instance, ECA reduces operational overheads by minimizing reliance on physical infrastructure, streamlining order processing, and improving inventory management. Nyarko et al. (2022) apply transaction cost economics to show that firms with high information specificity benefit significantly from e-commerce, as it lowers coordination costs and enhances service customization.

Moreover, e-commerce strengthens marketing capabilities, enabling MSMEs to overcome traditional constraints related to size and geographic reach. By establishing an online presence, small firms can access global markets, attract new customer segments, and maintain continuous engagement through 24/7 digital platforms. Criveanu (2023) integrates the TOE (Technology-Organization-Environment) framework with RBV to demonstrate that technological openness through e-commerce fosters stronger customer relationships and innovation, leading to improved firm performance. Abd-Elrahman & Kamal (2022) further confirmed that ECA positively influences efficiency, sales growth, customer satisfaction, and relational capital. Given these mechanisms, the following hypothesis is proposed:

**H1: E-commerce adoption has a significant positive effect on MSMEs' financial performance.**

### 2.2. E-Commerce Adoption and Sustainability

Sustainability in business encompasses economic, environmental, and social dimensions, requiring firms to balance profitability with ecological stewardship and societal responsibility. While large firms often lead in sustainability initiatives, MSMEs face structural barriers that limit their ability to adopt green practices (Rao et al., 2021). However, digital technologies offer a pathway for smaller firms to integrate sustainability into their operations. E-commerce, in particular, supports sustainable development by reducing the need for physical retail spaces, minimizing paper-based transactions, and optimizing logistics through route planning and demand forecasting (Pavan & Samant, 2024). Sarkar (2023) finds that e-commerce significantly influences energy consumption, carbon emissions, packaging waste, and transportation efficiency—key indicators of environmental sustainability. Additionally, e-commerce platforms enable MSMEs to market eco-friendly products to environmentally conscious consumers, thereby aligning business goals with

sustainability values. argue that when strategically implemented, e-commerce can provide a sustainable competitive advantage by enhancing transparency, traceability, and customer trust. Furthermore, digital operations allow for better monitoring of resource use and waste generation, supporting data-driven sustainability decisions. Given these contributions, the study posits:

**H2: E-commerce adoption positively influences the sustainability of MSMEs.**

### 2.3. Digital Marketing Adoption and Firm Performance

Digital marketing (DM) refers to the promotion of products and services through digital channels such as social media, search engines, email, and mobile applications (Aziz et al., 2023) Unlike traditional marketing, DM offers real-time analytics, targeted outreach, and cost-effective scalability—advantages that are particularly valuable for resource-constrained MSMEs (Supit & Langi, 2022). Despite its benefits, research indicates that digital marketing adoption among small firms remains uneven, with micro-enterprises often lagging due to limited technical expertise and budgetary constraints. Larger firms typically employ dedicated agencies for SEO and social media campaigns, while MSMEs must rely on internal capabilities, often using platforms like Facebook and Instagram for organic outreach (Rao et al., 2021).

Nevertheless, effective digital marketing enables MSMEs to build brand equity, engage niche markets, and compete with larger players on a more level playing field. Studies show that firms with higher digital marketing penetration experience greater customer acquisition, revenue growth, and market share expansion. Supit & Langi (2022) highlight that digital marketing reduces both tangible (e.g., printing costs) and intangible (e.g., time-to-market) expenses, allowing firms to reallocate resources toward innovation and service improvement. From an RBV standpoint, digital marketing capabilities represent a firm-specific asset that, when combined with existing competencies, creates unique value propositions (Gao et al., 2023). Therefore, the following hypothesis is proposed:

**H3: Digital marketing adoption has a significant positive impact on MSMEs' financial performance.**

### 2.4. Digital Marketing Adoption and Sustainability

Beyond driving sales, digital marketing plays a growing role in promoting sustainable business practices. As a communication tool, it allows firms to transparently share their environmental and social initiatives with stakeholders, enhancing corporate reputation and consumer trust. Bruce et al. (2023) note that businesses across sectors are incorporating sustainability messaging into their digital campaigns, using platforms to educate consumers about eco-friendly products and responsible consumption. In developing economies, digital marketing has enabled MSMEs to publicize green certifications, ethical sourcing, and carbon reduction efforts—actions that resonate with increasingly conscious buyers (Darban et al., 2023).

Moreover, digital marketing supports sustainability through dematerialization: replacing printed catalogs, flyers, and brochures with online content reduces paper waste and distribution emissions. The precision targeting enabled by digital analytics also minimizes wasteful advertising, ensuring that marketing efforts reach only relevant audiences (Saura et al., 2023). These efficiencies

contribute to both economic and environmental sustainability. Given these synergies, the study proposes:

**H4: Digital marketing adoption positively influences the sustainability performance of MSMEs.**

**2.5. Financial Performance and Sustainability: The Mediating Role of ECA & DMA**

The relationship between e-commerce adoption and sustainability, as well as digital marketing adoption and sustainability, is hypothesized to be mediated by firm financial performance. E-commerce adoption can significantly enhance a firm's operational efficiency, expand its market reach, and improve customer engagement, all of which contribute to better financial performance (Hosseini et al., 2020). By streamlining processes and optimizing resource allocation, e-commerce facilitates cost savings and enables firms to achieve economies of scale, ultimately resulting in stronger financial outcomes (Hosseini et al., 2020). With improved financial performance, firms are in a better position to allocate resources toward sustainability practices, such as adopting green technologies, investing in energy-efficient operations, or improving waste management practices (Singh et al., 2024). This financial cushion allows for long-term investment in initiatives that promote environmental and social sustainability, aligning with corporate social responsibility (CSR) goals.

Similarly, the adoption of digital marketing is expected to drive financial performance by optimizing marketing strategies, increasing consumer engagement, and broadening the customer base (Supit & Langi, 2022). Digital marketing tools, such as social media advertising, search engine optimization (SEO), and data analytics, enable firms to target specific customer segments, personalize communications, and measure marketing effectiveness, resulting in higher sales and improved profitability (Criveanu, 2023). As financial performance improves, firms are better positioned to invest in sustainable practices. These investments may include adopting energy-efficient technologies, reducing carbon footprints, or supporting sustainable sourcing practices, all of which contribute to a firm's overall sustainability objectives (Sharma & Henriques, 2005). The relationship between digital marketing adoption and sustainability is therefore not direct but is mediated through financial performance, as better financial outcomes provide the resources necessary for firms to invest in sustainability initiatives (Alshehhi et al., 2018).

H5 and H6 suggested that firm financial performance plays a critical mediating role in linking the adoption of e-commerce and digital marketing to sustainability outcomes. In both cases, the improved financial position that results from adopting these technologies provides firms with the capital required to invest in long-term sustainability goals. As such, financial performance serves as a crucial enabler, facilitating the firm's transition toward more sustainable business practices. Hence, it is hypothesized that:

**H5: The effect of e-commerce adoption on sustainability is mediated by firm financial performance.**

**H6: The effect of digital marketing adoption on sustainability is mediated by firm financial performance.**

ECA

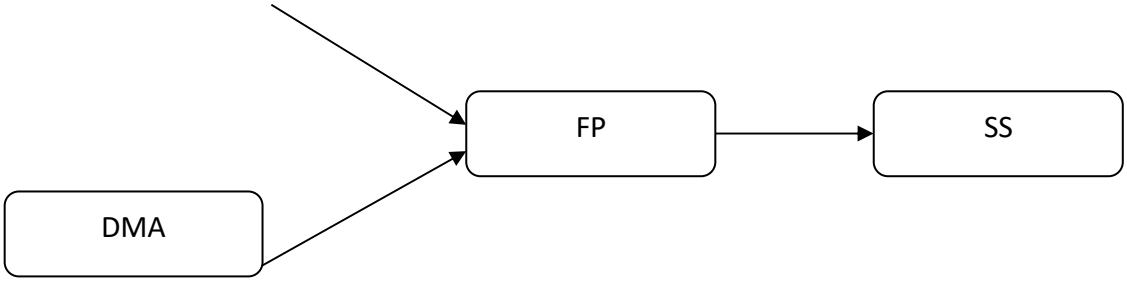


**Figure 1: Conceptual Framework**

## 3. Methodology

### 3.1. Measures

All constructs in the research model were operationalized using multi-item scales adapted from established scholarly sources. While the core items were drawn from prior validated studies, minor modifications were made to ensure contextual relevance to MSMEs operating during the post-outbreak period. The exogenous and endogenous variables were measured using a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), allowing respondents to express nuanced perceptions.

Prior to full-scale data collection, a pre-test was conducted following the instrument development guidelines proposed (Hair et al., 2020; Sarstedt et al., 2019). A panel of three experienced practitioners was provided with the complete set of measurement items. Each expert was asked to evaluate the content validity of the constructs by rating the extent to which each item reflected its intended concept on a 3-point scale: 3 (high relevance), 2 (moderate relevance), and 1 (not relevant). Only items rated as "3" by at least two experts and not scored "1" by any were retained in the final survey instrument, ensuring strong face and content validity.

E-commerce adoption (ECA) was assessed using seven items adapted from a widely cited framework in digital business research (Priambodo et al., 2022). These items captured the extent to which MSMEs utilized online platforms for key business functions during the pandemic, including digital advertising, online sales, e-purchasing, customer support, and data exchange with suppliers and clients. An aggregate index was computed by combining responses across the seven dimensions, providing a comprehensive measure of digital transactional engagement.

Digital marketing adoption (DMA) was evaluated using five validated items from (Dahiya & Gayatri, 2017), focusing on the use of digital tools such as business websites, social media pages (e.g., Facebook), YouTube channels, search engine optimization (SEO), and blog-based content. This scale measured the breadth and depth of digital outreach efforts aimed at engaging customers and business partners. Financial performance was measured with four indicators derived from (Aftab et al., 2024), including return on assets (ROA) and Return on Equity (ROE). Respondents assessed performance relative to pre-pandemic levels, offering a comparative financial outlook. Finally, sustainability performance was captured using five items adapted from (Mishra et al., 2020), reflecting the integration of environmental, social, and economic practices into business

operations. These items addressed aspects such as resource efficiency, waste reduction, employee well-being, and long-term operational resilience.

### 3.2. Data Collection and Sample

To test the hypothesized relationships, primary data were collected from MSMEs operating in four key sectors in Pakistan: wholesale and retail trade, pharmacies, restaurants, and electronics stores. These industries were selected due to their high exposure to digital disruption and consumer behavior shifts during the pandemic, making them ideal for studying digital adoption and performance outcomes.

A structured, self-administered questionnaire was developed to gather data on ECA, DMA, financial performance, and sustainability. To ensure reliability and clarity, the survey instrument was pilot-tested with five industry managers from each sector and three academic experts in entrepreneurship and digital business. Feedback from the pilot led to minor refinements in wording and formatting.

The final survey was distributed to 290 MSME managers who had decision-making authority and in-depth knowledge of their firm's operations. A cover letter accompanied each questionnaire, explaining the study's purpose, assuring confidentiality, and emphasizing voluntary participation. After two follow-up reminders, 212 fully completed responses were received, yielding a 73.1% response rate. Data collection occurred between June and November 2023, capturing strategic adaptations during a critical phase of pandemic recovery.

### 3.3. Respondents' Profile

The final sample consisted of 212 MSME managers. The majority (92%) had been with their organization for at least one year, and 81% had held their current managerial role for over 12 months, ensuring informed and reliable responses. Most respondents were aged between 25 and 50 (84%) and held post-secondary education (74%), indicating a relatively skilled managerial cohort.

In terms of market orientation, 58% of firms primarily served individual consumers, 15% served other businesses (B2B), and 27% operated in both B2C and B2B markets. By sector, 39% were in wholesale/retail, 26% in restaurants, 21% in pharmacies, and 14% in electronics. Firm age distribution was as follows: less than 3 years (17%), 3–5 years (31%), 6–10 years (29%), and over 10 years (23%). Regarding size, 54% of firms employed fewer than 20 people, 32% had 21–50 employees, and 14% had more than 50, reflecting a mix of micro, small, and medium enterprises.

### 3.4. Data Analysis Technique

The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the hypothesized relationships. PLS-SEM is particularly suitable for exploratory and predictive research involving complex models with multiple latent variables and mediating effects [98–100]. Unlike covariance-based SEM (CB-SEM), it does not require strict assumptions about data normality or large sample sizes, making it ideal for this study's sample and research objectives.

The analysis was conducted using Smart-PLS 3.3.3, which enables robust estimation of both measurement and structural models (Nguyen et al., 2022). The measurement model assessed reliability, convergent validity (via AVE and CR), and discriminant validity (HTMT ratio). The

structural model tested direct and indirect (mediated) path relationships. A bootstrapping procedure with 10,000 subsamples was used to compute t-values and evaluate the significance of path coefficients. This approach allowed for rigorous hypothesis testing while accounting for potential measurement error and enhancing model predictive power.

## 4. Result

### 4.1. Measurement Model

To evaluate the reliability and validity of the measurement model, a comprehensive assessment was conducted. The results are summarized in Table 2. Initial reliability was assessed through standardized factor loadings, with the widely accepted threshold set at 0.60. All indicators met this criterion except one (ECOM3 = 0.585), which was retained due to its proximity to the threshold and theoretical relevance, consistent with recommendations by (Hair Jr et al., 2020) for exploratory research.

Construct reliability was further evaluated using three metrics: Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). As shown in Table 2, all constructs exceeded the minimum threshold of 0.70 for both Cronbach's alpha and CR, indicating high internal consistency and reliability. Convergent validity was confirmed as the AVE values for all latent variables were above the recommended cutoff of 0.50 (Fornell & Larcker, 1981), suggesting that each construct captures a substantial portion of the variance in its indicators.

**Table 2. Reliability and Validity**

| Constructs | F. L | Alpha | CR | AVE |
|---|---|---|---|---|
| Digital Marketing | | | | |
| DM1 | 0.768 | 0.831 | 0.88 | 0.595 |
| DM2 | 0.818 | 0.831 | 0.88 | 0.595 |
| DM3 | 0.705 | 0.831 | 0.88 | 0.595 |
| DM4 | 0.782 | 0.831 | 0.88 | 0.595 |
| DM5 | 0.78 | 0.831 | 0.88 | 0.595 |
| E-commerce Adoption | | | | |
| ECOM1 | 0.775 | 0.852 | 0.887 | 0.531 |
| ECOM2 | 0.775 | 0.852 | 0.887 | 0.531 |
| ECOM3 | 0.585 | 0.852 | 0.887 | 0.531 |
| ECOM4 | 0.72 | 0.852 | 0.887 | 0.531 |
| ECOM5 | 0.752 | 0.852 | 0.887 | 0.531 |
| ECOM6 | 0.751 | 0.852 | 0.887 | 0.531 |
| ECOM7 | 0.725 | 0.852 | 0.887 | 0.531 |
| Firm Performance | | | | |
| FP1 | 0.93 | 0.886 | 0.925 | 0.758 |
| FP2 | 0.943 | 0.886 | 0.925 | 0.758 |
| FP3 | 0.917 | 0.886 | 0.925 | 0.758 |
| FP4 | 0.66 | 0.886 | 0.925 | 0.758 |

| | | | | |
|---|---|---|---|---|
| Sustainability | | | | |
| S1 | 0.856 | 0.892 | 0.922 | 0.703 |
| S2 | 0.915 | 0.892 | 0.922 | 0.703 |
| S3 | 0.868 | 0.892 | 0.922 | 0.703 |
| S4 | 0.855 | 0.892 | 0.922 | 0.703 |
| S5 | 0.68 | 0.892 | 0.922 | 0.703 |

Discriminant validity was assessed using two established criteria: the Fornell–Larcker criterion and the heterotrait-monotrait ratio (HTMT). According to the Fornell–Larcker criterion, the square root of the AVE for each construct should be greater than its correlations with other constructs. As displayed in Table 3, the diagonal values (representing the square roots of AVE) are consistently higher than the off-diagonal correlations, confirming adequate discriminant validity (Fornell & Larcker, 1981).

**Table 3. Fornell–Larcker Criterion**

| Constructs | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Digital Marketing | (0.771) | | | |
| E-commerce Adoption | 0.414 | (0.729) | | |
| Firm Performance | 0.579 | 0.511 | (0.87) | |
| Sustainability | 0.225 | 0.387 | 0.32 | (0.839) |

### 4.2. Hypotheses Testing

Before testing the structural model, multicollinearity was examined using the variance inflation factor (VIF). All VIF values were below 3.3, indicating no significant multicollinearity or common method bias (Hair et al., 2017). Additionally, Harman's single-factor test was performed following Podsakoff et al. (2003); an exploratory factor analysis of all items yielded a single factor explaining 33.7% of the total variance below the 50% threshold, confirming the absence of severe common method bias. the structural model demonstrated moderate to strong explanatory power. Specifically, it accounted for 42.4% of the variance in firm performance and 17.0% in sustainability, indicating a meaningful fit for the research context. Hypothesis testing was based on path coefficients, standard errors, and bootstrapped t-values (Table 4).

**Table 4. Results of Hypotheses Testing**

| Hypotheses | Coefficients | t-Statistics | Remarks |
|---|---|---|---|
| H1: E-commerce Adoption → Firm Performance | 0.332(0.066) *** | 4.993 | Supported |
| H2: E-commerce Adoption → Sustainability | 0.307(0.083) *** | 3.622 | Supported |
| H3: Digital Marketing → Firm Performance | 0.444(0.064) *** | 6.93 | Supported |

| | | | |
|---|---|---|---|
| H4: Digital Marketing → Sustainability | 0.005(0.091) | 0.051 | Not supported |
| H5: E-commerce Adoption → Firm Performance → Sustainability | 0.053(0.028) ** | 1.914 | Supported |
| H6: DMA → Firm Performance → Sustainability | 0.071(0.036) ** | 2.006 | Supported |

Here's a concise interpretation with the inclusion of the beta values:
The hypothesis testing results show that e-commerce adoption significantly influences both firm performance (H1: $\beta = 0.332$, $t = 4.993$) and sustainability (H2: $\beta = 0.307$, $t = 3.622$), with strong positive relationships. Digital marketing also positively impacts firm performance (H3: $\beta = 0.444$, $t = 6.93$), but does not directly affect sustainability (H4: $\beta = 0.005$, $t = 0.051$). Both e-commerce (H5: $\beta = 0.053$, $t = 1.914$) and digital marketing (H6: $\beta = 0.071$, $t = 2.006$) have indirect effects on sustainability through firm performance. Overall, while most hypotheses are supported, the direct link between digital marketing and sustainability is not.

## 5. Discussion

The global outbreak of the COVID-19 pandemic drastically reshaped business operations, with micro, small, and medium-sized enterprises (MSMEs) among the most severely affected [30]. Many small businesses were forced to shut down, while others experienced sharp declines in sales and profitability. This study focused on Pakistan as the research context for several compelling reasons (Gao et al., 2023; Hair Jr et al., 2020). MSMEs are a cornerstone of the national economy, contributing approximately 25% to GDP and holding significant potential for further growth. As an emerging economy, Pakistan has made notable strides in digital adoption, yet its MSME sector remains highly vulnerable to external shocks. In this climate, understanding how digital tools like e-commerce and digital marketing can support business continuity and long-term resilience is critical.

This research investigated how Pakistani MSMEs leveraged e-commerce and digital marketing to sustain operations during the pandemic. Data were collected from 212 MSME managers across wholesale and retail, pharmacies, restaurants, and electronics sectors. The findings reveal that H1 e-commerce adoption (ECA) had a strong positive impact on financial performance. Firms that utilized online platforms for sales, procurement, marketing, and supply chain coordination demonstrated better operational outcomes. These results align with (Theodorakopoulos & Theodoropoulou, 2024), who emphasize that digital integration enhances efficiency, market access, and competitive positioning. E-commerce functions not only as a transactional tool but as a strategic platform for inter-organizational collaboration, directly contributing to improved firm performance (Aftab et al., 2024). Moreover, the study confirms H2 that ECA positively influences sustainability. By reducing reliance on physical infrastructure, minimizing paper usage, and optimizing logistics, e-commerce contributes to environmental efficiency. These operational improvements support sustainable business models, consistent with findings by Hussain et al. (2020). The cost savings and scalability enabled by digital platforms allow firms to reinvest in sustainable practices, leading to long-term value creation. H3, i.e. Digital marketing adoption (DMA) was also found to significantly enhance financial performance. This aligns with prior

research indicating that online marketing strategies—such as social media engagement, SEO, and email campaigns—help MSMEs reach broader audiences at lower costs. similarly observed that digital marketing strengthens customer relationships and drives revenue growth. Our results support Capolupo (2023), who found that MSMEs using platforms like Facebook achieve better financial and operational outcomes due to cost-effective outreach and real-time feedback. However, H4 found no significant direct relationship between DMA and sustainability. This contrasts with (Hendrawan et al., 2024), who argue that digital marketing supports sustainability by promoting green branding and stakeholder engagement. The discrepancy may stem from contextual factors: in Pakistan, digital marketing is still in its early stages, and many MSMEs lack access to advanced analytics, big data tools, or skilled personnel needed to align marketing with sustainability goals (Hussain et al., 2020). Additionally, limited awareness and infrastructure hinder the integration of digital marketing into broader sustainability strategies. Finally, the results demonstrate a significant mediating role of financial performance in the relationships between both ECA and DMA with sustainability. This means that while digital marketing may not directly improve sustainability, it does so indirectly by first enhancing financial outcomes, which can then be channeled into sustainable initiatives. To the best of our knowledge, this is among the first studies to empirically validate this dual-path mechanism in an emerging economy during a global crisis.

### 5.1. Theoretical Implications

This research contributes to multiple academic domains. First, it extends the resource-based view (RBV) by positioning e-commerce and digital marketing as strategic resources that generate competitive advantage when effectively integrated. Second, it enriches the sustainability literature by demonstrating how digital technologies indirectly support sustainability through improved financial health. Third, it addresses a critical gap by focusing on MSMEs in an emerging economy, where digital transformation is still evolving. Most prior studies have centered on large firms in developed nations; this work provides context-specific insights into how smaller firms in developing regions can leverage technology for resilience.

### 5.2. Managerial Implications

Managers should prioritize e-commerce adoption to enhance both profitability and sustainability. Transitioning from brick-and-mortar to online platforms can expand market reach and reduce operational costs. Digital marketing should be viewed not as a one-time campaign but as an ongoing strategic function requiring investment in skills and tools. Training employees in data analytics, content creation, and social media management is essential. Government agencies like the SME Foundation and Pakistan Bank can support this transition through training programs, subsidies, and policy incentives to promote digital and sustainable practices.

### 6.3. Limitations and Future Research Directions

This study is limited to four sectors in Pakistan during a specific crisis period. Future research could explore other industries, such as manufacturing or services, and compare findings across different economic cycles or countries. Cross-national studies could examine how institutional support and digital infrastructure influence the effectiveness of digital adoption. Additionally,

longitudinal research could assess the long-term sustainability impacts of digital transformation beyond the pandemic.

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