

Adoption of E-Commerce by Small and Medium Enterprises (SMEs) and Its Effect on Business Performance: An Analytical Study of Determinants, Challenges, and Strategic Implications in the Indian Context

Dr Ram Dhan Saini

Lecturer, Department of Accountancy and Business Statistics, Government Girls College , Chomu (Jaipur)

Abstract

The emergence of e-commerce has transformed the global business environment, redefining the manner in which firms interact with customers, manage supply chains, and compete in domestic and international markets. For Small and Medium Enterprises (SMEs), e-commerce adoption represents not merely a technological innovation but a strategic shift influencing overall business performance. This study explores the patterns, determinants, and performance implications of e-commerce adoption among Indian SMEs, examining technological, organizational, and environmental factors through a mixed-method analytical approach. Drawing from established theoretical models such as the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, and the Technology–Organization–Environment (TOE) framework, the study evaluates how managerial attitudes, technological readiness, and institutional support affect adoption intensity.

The analysis reveals that although awareness of digital tools has increased significantly among Indian SMEs since the early 2010s, the adoption rate remains uneven due to financial constraints, inadequate infrastructure, and low digital literacy. Nevertheless, firms that successfully integrate e-commerce platforms exhibit improved performance across marketing efficiency, sales growth, and customer satisfaction dimensions. The findings suggest that e-commerce serves as both a cost-reduction mechanism and a market expansion strategy, particularly for SMEs seeking to overcome geographic and structural limitations.

This research highlights critical challenges faced by SMEs, including cybersecurity risks, lack of skilled human resources, and cultural resistance to digital change. It also identifies policy imperatives such as digital training, infrastructure enhancement, and improved financial access for SMEs. The study concludes that strategic alignment between technology and organizational goals is essential to realize the full performance benefits of e-commerce adoption. The findings carry significant implications for policymakers, business owners, and technology providers aiming to foster a more inclusive digital ecosystem within India's SME sector.

Keywords: *E-commerce adoption, Small and Medium Enterprises, Business performance, Technology-Organization-Environment, Digital transformation, Innovation diffusion, Indian SMEs.*

I. Background of E-Commerce

The emergence of electronic commerce during the late 1990s and its gradual consolidation into the mainstream economy marked one of the most significant transformations in the global business environment. By 2016, e-commerce had already transcended its early association with large multinational corporations and begun to shape the strategic and operational frameworks of small and medium enterprises (SMEs). In the Indian context, the integration of information and communication technologies (ICT) into commercial transactions redefined market accessibility, competition, and business processes. E-commerce refers broadly to the buying and selling of goods and services, and the transfer of funds or data, over an electronic network, primarily the internet. It encompasses various formats, including business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C), and increasingly, business-to-government (B2G) platforms. During the early phase of e-commerce in India, adoption was limited to large firms with sufficient technological infrastructure and managerial expertise to engage in online transactions. However, as internet penetration deepened, mobile connectivity improved, and digital payment systems became more secure, SMEs began to realize the strategic advantages of e-commerce participation. By 2015, India's internet user base had crossed 350 million, positioning it among the top three online markets globally. This growth provided fertile ground for the digital inclusion of small enterprises that historically faced market entry barriers due to limited capital, geographic constraints, and inadequate marketing channels. The Indian government's policy thrust toward "Digital India" further encouraged enterprises to integrate ICT tools into their operations, enhancing both transparency and competitiveness.

E-commerce offered SMEs new pathways for survival and growth in an increasingly competitive market. It allowed them to reach customers beyond local boundaries, access real-time market information, reduce transaction costs, and improve operational efficiency. The ability to operate online redefined the way SMEs

interacted with suppliers, distributors, and customers. The integration of e-commerce was not merely an extension of physical sales into the digital sphere but a transformation of business models, supply chain relationships, and marketing practices. The result was a fundamental restructuring of how value was created and delivered. In India, SMEs constitute approximately 40 percent of total industrial production and contribute significantly to exports and employment. Their adoption of e-commerce, therefore, has implications not only for firm-level performance but also for broader economic growth. Scholars in the mid-2010s observed that small enterprises using online platforms often reported increased visibility, reduced dependence on intermediaries, and enhanced market responsiveness (Rao, 2015). The shift toward e-commerce adoption among SMEs is thus both a technological and socio-economic phenomenon reflecting India's digital transformation.

II. Adoption of Technology by SMEs

The literature on technology adoption among small and medium enterprises highlights that SMEs often face distinctive constraints compared with large organizations. These include limited access to financial resources, inadequate technical expertise, and resistance to change within organizational culture. The decision to adopt new technologies such as e-commerce is typically influenced by a combination of internal and external factors — managerial attitude, perceived usefulness, competitive pressure, customer expectations, and technological readiness. The Technology Acceptance Model (TAM) proposed by Davis (1989) and subsequent extensions by Rogers (2003) through the Diffusion of Innovations framework have been instrumental in explaining adoption behavior. Within the SME sector, the perceived ease of use and perceived usefulness of e-commerce applications determine the likelihood of adoption. However, in developing economies like India, infrastructural readiness — including internet speed, logistics support, and online payment security — plays a decisive role. By 2016, broadband penetration had reached deeper into semi-urban areas, and mobile-based commerce (m-commerce) was emerging as a cost-effective alternative for small entrepreneurs who lacked advanced computing infrastructure.

Indian SMEs, particularly in manufacturing, retail, and service sectors, gradually began to perceive e-commerce not merely as a sales channel but as a tool for business integration. Platforms such as Flipkart Marketplace, Amazon India, Snapdeal, and TradeIndia enabled small producers to directly connect with consumers nationwide. Meanwhile, B2B platforms facilitated procurement and supplier management for small manufacturers. Empirical evidence from mid-2010s surveys indicated that SMEs adopting digital trading platforms observed tangible improvements in order processing time, inventory management, and customer satisfaction (Chatterjee & Das, 2015). Despite these advantages, adoption remained uneven. Many small enterprises, particularly in traditional sectors such as handicrafts, textiles, and food processing, remained skeptical of technology-driven commerce due to lack of awareness, digital literacy, and trust in online payment systems. Additionally, infrastructural bottlenecks such as unreliable power supply, inadequate logistics, and weak cybersecurity frameworks inhibited full integration of e-commerce processes. Financial institutions were still hesitant to extend credit for technology investments in smaller enterprises. Consequently, the diffusion of e-commerce among SMEs displayed a dual character: rapid in technology-oriented sectors, yet slow in traditional manufacturing and rural enterprises.

The organizational structure of SMEs also influenced adoption behavior. Owner-managers often play a decisive role, and their personal perception of technology's benefits or risks directly affects organizational decisions. Studies around 2015 revealed that entrepreneurial orientation, risk appetite, and prior exposure to digital tools were critical determinants of e-commerce adoption. Unlike larger corporations that could employ specialized IT departments, small enterprises relied on informal networks, peer learning, and vendor support to manage online operations. Therefore, capacity-building and awareness initiatives were vital in promoting sustainable digital transformation among Indian SMEs. Another dimension of adoption pertains to customer-driven pressure. As consumers increasingly embraced online purchasing, SMEs found it necessary to maintain an online presence to remain competitive. Even small retailers started using social media platforms and third-party marketplaces to reach digitally connected consumers. The convergence of technology, market forces, and government policy thus created an environment conducive to digital adoption. Nevertheless, the speed and depth of this transition varied across regions, sectors, and firm sizes.

III. Impact on Business Performance

The integration of e-commerce within SME operations affects multiple dimensions of business performance, including sales growth, profitability, productivity, customer acquisition, and innovation capability. In India, where small enterprises historically operated within localized markets, e-commerce adoption expanded their operational horizon. Firms that embraced online platforms gained exposure to new market segments and customer bases, enhancing both revenue potential and brand visibility. Empirical observations in 2015–2016 suggested that SMEs participating in e-commerce experienced measurable performance improvements. For instance, online presence facilitated 24×7 operations, enabled real-time communication with customers, and

reduced dependence on intermediaries. Transaction automation decreased administrative costs, while digital marketing enhanced promotional effectiveness. Moreover, data analytics derived from online transactions provided valuable insights into consumer preferences, enabling product innovation and demand forecasting. These operational efficiencies collectively improved the overall competitiveness of SMEs.

However, performance gains were not uniform. The extent to which e-commerce translated into tangible results depended on the firm's strategic alignment, technological capability, and supply chain coordination. SMEs that treated e-commerce as a core strategic function tended to outperform those that adopted it merely as a supplementary channel. Firms with integrated digital logistics and responsive customer-service systems recorded higher customer retention rates and repeat orders. Conversely, enterprises lacking backend integration or efficient delivery mechanisms often faced customer dissatisfaction and operational inefficiencies. One of the critical benefits of e-commerce for SMEs in India was access to geographically dispersed markets. Online platforms allowed small businesses from tier-2 and tier-3 cities to reach urban consumers nationwide. This geographical diffusion democratized market participation, reducing entry barriers for rural entrepreneurs. For example, artisans and micro-manufacturers could list their products online without needing physical retail outlets, thus saving rental and distribution costs. The result was an inclusive digital ecosystem fostering entrepreneurship and innovation at the grassroots level. Furthermore, e-commerce facilitated improved financial performance through enhanced cash-flow management. Digital transactions reduced the risk of bad debts, while prompt online payments improved liquidity. SMEs adopting e-invoicing and digital accounting tools streamlined financial reporting and compliance. Additionally, collaboration with online marketplaces often provided small sellers with access to value-added services such as packaging support, logistics management, and consumer analytics, further strengthening their operational efficiency.

Despite these advantages, challenges persisted. Increased online competition compressed profit margins, and dependence on large e-commerce platforms sometimes reduced bargaining power for small sellers. Additionally, SMEs encountered issues related to product returns, fraudulent transactions, and high commission fees. Therefore, while e-commerce adoption contributed positively to business performance, its sustainability depended on strategic management, customer relationship quality, and cost-control mechanisms. From a macroeconomic perspective, the enhanced performance of digitally enabled SMEs contributed to employment generation, export promotion, and overall productivity growth. Government initiatives such as "Make in India" and "Start-Up India" aligned well with e-commerce adoption trends, highlighting the sector's potential to drive inclusive economic development. By 2016, policymakers recognized the need for digital infrastructure investments and skill-development programs to sustain the momentum of e-commerce among small businesses.

IV. Rationale of the Study

The rationale behind studying the adoption of e-commerce by SMEs in India stems from the critical role these enterprises play in the national economy and the transformative potential of digital technologies. SMEs account for a substantial share of India's GDP, exports, and employment. Yet, they operate in a highly competitive and resource-constrained environment. The digital revolution offered these enterprises new avenues for efficiency, growth, and competitiveness. Understanding how and why SMEs adopt e-commerce — and the extent to which it affects their business performance — provides valuable insights for policymakers, practitioners, and researchers. During the mid-2010s, the Indian economy was characterized by rapid digitization, expansion of mobile internet, and changing consumer behavior. Consumers increasingly preferred online channels for purchasing goods and services, compelling even small businesses to engage digitally. However, the degree of readiness among SMEs to participate in this digital economy varied significantly. While some firms swiftly adopted e-commerce platforms, others remained hesitant due to infrastructural limitations, lack of awareness, or perceived risk. This heterogeneity in adoption behavior raised pertinent questions regarding the determinants, processes, and outcomes of e-commerce integration.

Moreover, the relationship between technology adoption and business performance is not always linear. While e-commerce theoretically enhances efficiency and profitability, the realized benefits depend on contextual factors such as firm size, managerial capability, sectoral characteristics, and technological infrastructure. Therefore, a systematic examination of the impact of e-commerce adoption on SME performance is essential to identify the conditions under which digital transformation yields optimal results. Such analysis also informs the design of supportive policies and capacity-building programs aimed at accelerating SME digitization. The study also holds significance in light of India's policy objectives during this period. The "Digital India" initiative launched in 2015 aimed to empower citizens and businesses through digital access and literacy. The government's emphasis on technology-driven growth created a conducive environment for SMEs to embrace e-commerce. Yet, empirical evidence on the actual impact of such adoption remained limited. Investigating this relationship bridges the gap between policy intent and business reality, contributing to both academic literature and practical decision-making. Another rationale arises from the global competitiveness dimension. As India aspired to integrate more deeply into global value chains, digitally enabled SMEs could serve as agile suppliers and exporters. E-commerce

facilitated cross-border trade, allowing small firms to access international markets without substantial capital investment. Understanding how Indian SMEs leveraged such opportunities provides critical insights into the broader discourse on globalization and digital inclusion.

V. Research Gaps

Although numerous studies between 2010 and 2015 explored technology adoption in SMEs, relatively few examined the specific link between e-commerce adoption and firm performance in the Indian context. Existing literature predominantly focused on large enterprises or generic ICT adoption, overlooking sectoral and regional variations among smaller firms. The empirical evidence available tended to emphasize the benefits of digital marketing or online sales but provided limited understanding of how e-commerce integration influenced operational and financial outcomes comprehensively. Furthermore, prior research often adopted cross-sectional approaches without considering the longitudinal dynamics of technology assimilation. SMEs' digital adoption is not a one-time decision but an evolving process involving continuous learning, resource allocation, and capability development. Studies rarely captured this evolutionary aspect, leading to an incomplete understanding of performance implications over time.

Another research gap lies in the lack of disaggregated analysis. Most studies treated SMEs as a homogeneous group, despite substantial differences between micro, small, and medium enterprises. The adoption drivers and performance impacts likely vary across these categories. Moreover, sectoral distinctions — such as manufacturing versus services — influence both technological needs and customer interaction patterns. Addressing these variations is essential for drawing meaningful conclusions applicable to diverse business contexts. Finally, there existed limited empirical work on the mediating and moderating variables linking e-commerce adoption and business performance. Factors such as organizational culture, leadership style, market orientation, and technological competence potentially influence the strength of this relationship. Exploring these dimensions enhances the theoretical robustness and practical relevance of the study. Thus, this research aims to fill these identified gaps through systematic investigation and contextual analysis.

VI. Objectives of the Study

Based on the rationale and identified research gaps, the following objectives are framed for the present study:

1. **To examine the extent of e-commerce adoption among small and medium enterprises in India.** This objective seeks to assess the level of awareness, readiness, and implementation of e-commerce tools among Indian SMEs, identifying sectoral and regional patterns.
2. **To identify the key factors influencing the adoption of e-commerce by SMEs.** This includes analyzing internal organizational factors (such as managerial attitude, financial capability, and technological competence) as well as external environmental factors (such as competitive pressure, government policy, and customer demand).
3. **To evaluate the impact of e-commerce adoption on business performance.** The study aims to measure changes in operational efficiency, sales growth, profitability, and market expansion attributable to e-commerce integration.
4. **To explore the challenges and barriers faced by SMEs in adopting and sustaining e-commerce practices.** Understanding these obstacles provides insights into the policy and infrastructural interventions required to support digital transformation.
5. **To suggest strategies and policy implications for enhancing e-commerce adoption among Indian SMEs.** Based on empirical findings, recommendations will be made to facilitate sustainable digital inclusion and competitiveness of SMEs in the evolving market environment.

VII. Significance of the Study

The study holds academic, practical, and policy significance. Academically, it contributes to the growing body of knowledge on digital transformation within emerging economies. By focusing on SMEs, it enriches the discourse on technology adoption beyond large corporations, offering nuanced insights into the interplay between digitalization and firm performance. The study also provides empirical evidence relevant to technology adoption models such as TAM and Diffusion of Innovation Theory, contextualizing them within the Indian SME ecosystem. Practically, the findings will assist SME owners and managers in understanding how e-commerce can enhance their competitiveness. Identifying best practices and critical success factors enables small firms to design effective digital strategies and allocate resources judiciously. The study also sheds light on potential pitfalls and sustainability challenges, helping enterprises to adopt a balanced approach toward online integration. From a policy perspective, the research offers evidence-based guidance for government agencies and support institutions. It identifies infrastructural, regulatory, and financial bottlenecks hindering SME digitization. Such insights can inform targeted interventions — including capacity-building programs, technology subsidies, and digital literacy initiatives — essential for achieving inclusive growth in the digital economy.

7.1 Introduction

The review of literature provides a conceptual and empirical foundation for understanding how small and medium enterprises (SMEs) adopt e-commerce technologies and how such adoption influences their business performance. Since e-commerce encompasses multiple dimensions—technological, organizational, environmental, and behavioral—researchers across disciplines have examined it from varied perspectives. Between 2000 and 2016, the global scholarship on e-commerce evolved from studying technology readiness and adoption behavior to exploring strategic integration and performance outcomes. For developing economies like India, this research acquired special significance because SMEs constitute the backbone of industrial and employment growth. Understanding the nature of digital adoption within this sector is crucial for explaining how technology enables competitiveness, innovation, and inclusive development.

7.2 Conceptualizing E-Commerce Adoption

Early conceptualizations of e-commerce adoption were largely rooted in information systems theory, focusing on the diffusion and acceptance of new technologies. Rogers' (2003) **Diffusion of Innovation Theory (DOI)** provided one of the earliest frameworks explaining how innovations spread across individuals and organizations. According to this theory, adoption depends on perceived attributes of the innovation—relative advantage, compatibility, complexity, trialability, and observability. Subsequent research applied this model to explain differences in e-commerce uptake among firms of varying sizes and sectors. In SMEs, owner–manager characteristics often substituted for organizational variables, reflecting the personal and behavioral dimension of adoption. The **Technology Acceptance Model (TAM)** developed by Davis (1989) refined the psychological understanding of technology use. It proposed that perceived usefulness and perceived ease of use directly influence users' intention to adopt technology. TAM was extensively applied to e-commerce adoption studies, particularly in small business contexts where managerial attitudes and cognitive perceptions were decisive. Later versions of TAM integrated constructs such as trust, cost-benefit perception, and facilitating conditions to better explain e-commerce acceptance among SMEs (Venkatesh & Bala, 2008). The **Technology–Organization–Environment (TOE) framework** proposed by Tornatzky and Fleischer (1990) offered a more holistic view. It suggested that technology adoption in firms is influenced by technological context (availability and relevance of technologies), organizational context (size, structure, managerial support), and environmental context (competitive pressure, regulatory environment, and customer readiness). In SME research, this framework was widely used to examine how internal readiness and external environmental forces jointly shape e-commerce decisions. Studies applying TOE to Indian SMEs during the mid-2010s emphasized the importance of government incentives, infrastructure, and market dynamics.

Beyond these classical frameworks, hybrid models emerged combining TAM, DOI, and TOE to capture the multifaceted nature of e-commerce adoption. Researchers such as Ghobakhloo (2011) and Kshetri (2014) argued that no single theoretical framework sufficiently explains the complexities of e-commerce adoption among SMEs in developing economies, where socio-economic and institutional factors are deeply intertwined with technological readiness.

7.3 Global Studies on SME E-Commerce Adoption

Globally, research on e-commerce adoption among SMEs gained prominence during the early 2000s as internet penetration expanded. Studies in developed economies like the United States, the United Kingdom, and Australia emphasized technological sophistication and strategic orientation as key determinants. For instance, Levy and Powell (2003) found that SMEs with higher information intensity and customer-facing operations were early adopters of e-commerce. Similarly, Poon and Swatman (2005) demonstrated that strategic motivation rather than technological availability often drove online adoption among Australian SMEs. In Europe, Fillis, Johansson, and Wagner (2004) examined the role of entrepreneurial attitude in shaping e-commerce adoption. They discovered that firms with proactive, innovative, and risk-tolerant managers were more likely to integrate digital tools into their operations. In contrast, risk aversion, lack of vision, and resource constraints delayed adoption. Studies from Scandinavian economies further emphasized the cultural and institutional support for SMEs in transitioning toward online business models. In Asian economies such as China, Malaysia, and Singapore, the focus shifted to infrastructural readiness and government policy. Tan, Tyler, and Manica (2007) analyzed Malaysian SMEs and identified financial resources, ICT skills, and perceived benefits as primary drivers. Similarly, Zhu, Kraemer, and Xu (2006) in their cross-country comparison found that the impact of e-commerce adoption on performance was mediated by supply chain integration and process reengineering.

By the mid-2010s, scholars began to emphasize dynamic capabilities and absorptive capacity—the firm's ability to learn and adapt to technological changes. These studies linked e-commerce adoption to innovation performance, export competitiveness, and market expansion. For example, Lin and Lin (2008) observed that SMEs using e-commerce effectively could overcome traditional size limitations and achieve global reach, but required continuous learning and strategic alignment. Despite this wealth of research, gaps remained in understanding how developing-country SMEs navigate infrastructural, financial, and cultural constraints. The

Western-centric frameworks did not always capture the institutional realities of economies like India, where digital ecosystems were still evolving.

7.4 E-Commerce Adoption in the Indian Context

The Indian context presents a distinct narrative shaped by socio-economic diversity, government policy, and rapid technological change. Since the early 2010s, e-commerce in India has grown exponentially due to improved internet access, mobile penetration, and digital payment systems. The rise of online marketplaces such as Flipkart (founded 2007) and Amazon India (launched 2013) significantly influenced SME participation in the digital economy. Empirical studies during 2013–2016 began documenting this transition. Singh and Kundu (2014) highlighted that Indian SMEs viewed e-commerce as a strategic necessity rather than an optional innovation. They found that perceived benefits—such as broader market access, reduced costs, and improved brand recognition—motivated adoption. However, infrastructural barriers, inadequate ICT skills, and lack of government support impeded widespread diffusion. Similarly, Sharma and Sheth (2015) revealed that SMEs with better managerial awareness and access to digital infrastructure demonstrated higher levels of adoption.

A significant contribution came from the National Association of Software and Services Companies (NASSCOM, 2015), which reported that SMEs integrating online platforms recorded 30–50 percent higher revenue growth compared to non-adopters. Yet, adoption was uneven across regions: metropolitan clusters such as Delhi-NCR, Mumbai, and Bangalore led the transformation, while rural and semi-urban enterprises lagged due to weak connectivity and lack of digital literacy. Researchers such as Bhatnagar (2015) and Rajan (2016) emphasized the role of government initiatives like “Digital India” and “Make in India” in accelerating adoption. The proliferation of low-cost smartphones and online payment gateways also lowered entry barriers for small entrepreneurs. However, security concerns, trust issues, and logistic inefficiencies persisted as deterrents. By 2016, academic consensus suggested that Indian SMEs were at a critical inflection point: while the potential of e-commerce was widely acknowledged, realization of benefits required overcoming systemic bottlenecks related to infrastructure, skills, and institutional support. The Indian case thus became an important example for other developing economies transitioning into digital markets.

7.5 Determinants of E-Commerce Adoption in SMEs

A large body of literature identifies diverse factors influencing e-commerce adoption among SMEs. These determinants can be grouped under **technological**, **organizational**, and **environmental** categories, corresponding to the TOE framework.

Technological Factors

Technological factors refer to the characteristics of e-commerce technology perceived by SMEs. Studies by Premkumar and Roberts (1999) and later by Chong (2011) indicated that relative advantage, compatibility, and complexity significantly affect adoption decisions. SMEs are more inclined to adopt technologies that are user-friendly, low-cost, and compatible with their existing systems. For instance, web-based marketplaces and mobile apps gained popularity among Indian SMEs because they required minimal investment and technical expertise. Perceived usefulness—the degree to which e-commerce enhances performance—remains the most consistent predictor across studies. SMEs adopt online systems when they clearly perceive operational benefits such as cost savings, faster transactions, and improved market access. However, technological uncertainty and security risks can negatively influence adoption. In India, concerns regarding online fraud, payment failures, and data privacy continued to deter some SMEs from full-scale adoption (Rao, 2015).

Organizational Factors

Organizational readiness—comprising financial resources, managerial support, and human skills—plays a crucial role. Caldeira and Ward (2003) noted that SMEs with stronger managerial leadership and internal IT expertise were more likely to adopt and sustain e-commerce. Owner-manager attitude emerged as a dominant determinant, especially in small family-run businesses where decision-making is centralized. Entrepreneurial orientation, openness to innovation, and prior exposure to technology significantly enhance adoption likelihood. In the Indian setting, micro-enterprises often struggle with financial limitations, which restrict investment in website development, digital marketing, and logistics. However, some studies observed that external partnerships—such as collaborations with e-commerce platforms or service providers—can mitigate these constraints. For instance, Flipkart and Amazon offered seller-support programs enabling small firms to digitize their sales with minimal upfront costs.

Environmental Factors

Environmental conditions such as market competition, customer pressure, and government policy also influence adoption. Porter and Millar (1985) argued that competitive intensity drives firms to adopt technologies that enhance efficiency and differentiation. Empirical evidence from Indian SMEs supports this notion—enterprises

operating in competitive retail or manufacturing segments often turned to e-commerce as a survival strategy (Rajan, 2016). Customer readiness and demand for online interaction further motivate adoption. As Indian consumers increasingly embraced digital shopping, small retailers recognized the need to maintain an online presence. Additionally, government initiatives promoting digital payments and online taxation compliance indirectly encouraged e-commerce integration. The overall ecosystem—comprising payment gateways, logistics, and digital marketing infrastructure—thus shaped SMEs' readiness and willingness to participate.

7.6 Impact of E-Commerce Adoption on SME Performance

While adoption factors are well-documented, studies examining the performance impact of e-commerce adoption reveal mixed results. Performance can be evaluated along multiple dimensions—financial, operational, market, and strategic.

Financial Performance

E-commerce can enhance profitability by reducing transaction costs, improving cash flow, and expanding market reach. Studies such as Gibbs and Kraemer (2004) found positive correlations between e-commerce adoption and firm profitability in developed markets. Indian studies during 2014–2016 also indicated revenue growth and cost efficiency among digitally active SMEs. For instance, Rajan (2016) reported that SMEs using online marketplaces achieved up to 25 percent higher annual sales compared to offline counterparts. However, other studies observed that benefits may not be immediate. Initial investments in technology, website maintenance, and digital marketing can strain financial resources. In some cases, high competition on online platforms led to price wars, eroding profit margins. Therefore, long-term profitability depends on strategic differentiation and customer loyalty rather than mere online presence.

Operational Efficiency

E-commerce adoption streamlines internal operations through automation and information sharing. Order processing, inventory control, and communication become faster and more accurate. Studies by Zhu and Kraemer (2005) demonstrated that firms adopting e-commerce achieved significant gains in productivity and supply-chain coordination. In India, SMEs utilizing digital inventory management tools reported reduced wastage and improved turnaround times (Sharma & Sheth, 2015). Nevertheless, the extent of improvement depends on integration between front-end (sales) and back-end (operations) systems.

Market and Strategic Performance

E-commerce enhances market performance by enabling firms to access new customer segments and geographic markets. SMEs in remote or rural areas can sell to urban consumers nationwide. Additionally, online visibility strengthens brand recognition and customer engagement. Strategic benefits include enhanced competitiveness, innovation capability, and resilience against market shocks. Scholars such as Bharadwaj (2013) linked digital adoption to dynamic capabilities—the ability of firms to reconfigure resources and respond to changing environments. However, the strategic benefits are realized only when e-commerce is embedded within overall business strategy. SMEs treating e-commerce as a supplementary channel without aligning it to their core processes may not achieve sustainable performance gains. Studies from Indian manufacturing clusters indicated that lack of digital integration with supply-chain partners limited the strategic value of e-commerce adoption.

7.7 Theoretical Frameworks Linking E-Commerce and Performance

Several theoretical lenses have been employed to explain how e-commerce affects SME performance:

1. **Resource-Based View (RBV):** This theory posits that firms gain competitive advantage by developing valuable, rare, inimitable, and non-substitutable resources. E-commerce capabilities—such as digital marketing expertise, data analytics, and online customer relationships—constitute strategic resources enhancing firm performance (Barney, 1991). In the SME context, e-commerce adoption reflects not only technology use but also capability development.
2. **Dynamic Capabilities Theory:** Teece et al. (1997) extended RBV by emphasizing the firm's ability to integrate, build, and reconfigure internal and external competencies. E-commerce adoption requires SMEs to continuously adapt to technological changes, update skills, and redesign processes. Firms with strong learning and adaptation mechanisms derive higher performance benefits.
3. **Innovation Diffusion and Learning Theories:** Adoption of e-commerce involves organizational learning and behavioral change. SMEs gradually progress from basic online presence to advanced e-business integration. Each stage generates learning that influences subsequent performance. In developing economies, learning from networks, suppliers, and government programs significantly accelerates this process.
4. **Institutional Theory:** Institutional pressures—regulatory norms, industry standards, and social expectations—drive firms toward technology adoption. In India, government-led digitalization policies and market norms compel SMEs to conform to digital practices, indirectly influencing performance outcomes.

These frameworks collectively illustrate that e-commerce adoption affects performance not in isolation but through complex interactions of resources, capabilities, and institutional contexts.

7.8 Challenges and Barriers Highlighted in Literature

Despite recognized advantages, several barriers impede effective adoption of e-commerce by SMEs. Studies across regions consistently identify financial constraints, lack of ICT skills, resistance to change, infrastructural deficiencies, and security concerns as persistent obstacles. In India, high logistics costs, unreliable internet connectivity, and limited awareness among entrepreneurs remain significant barriers (Bhatnagar, 2015). Additionally, lack of trust in online transactions deters both sellers and buyers, particularly in rural areas. Cultural factors, including preference for personal negotiation and cash transactions, also inhibit full digital transformation. Organizational inertia and limited change management capacity exacerbate the challenge. Many SME owners perceive e-commerce as complex or irrelevant to their traditional operations. Absence of skilled manpower for digital marketing, web design, and data analytics further limits adoption depth. Literature also highlights external barriers such as inadequate policy support, taxation ambiguity, and lack of financial incentives for technology investment. By 2016, researchers emphasized the need for multi-stakeholder collaboration to overcome these challenges. Partnerships among government agencies, industry associations, and private platforms were viewed as essential to foster digital inclusion. Yet, empirical evaluation of such collaborative frameworks remained scarce, marking an important gap in the literature.

7.9 Emerging Trends and Future Research Directions

Recent literature (2014–2016) pointed toward emerging trends that would shape the future of SME e-commerce. The rise of **mobile commerce (m-commerce)** was particularly significant, offering cost-effective entry for small businesses. With smartphone penetration rising rapidly, SMEs could reach customers through mobile apps and social media, bypassing traditional website infrastructure. Social commerce—using social networks for marketing and sales—also gained traction, especially among micro-enterprises targeting niche markets. Cloud computing and digital payment ecosystems were recognized as enablers of SME competitiveness. Cloud-based solutions allowed firms to access sophisticated software without heavy capital expenditure. Meanwhile, government initiatives promoting digital payments improved transaction efficiency. Researchers began exploring how these technologies collectively contribute to business performance, signaling a shift from isolated adoption studies to integrated digital ecosystem analyses. Another emerging focus was **customer relationship management (CRM)** in e-commerce. Scholars argued that maintaining long-term customer relationships through personalized online interactions enhances loyalty and profitability. Data analytics and customer feedback mechanisms became critical tools for performance improvement. However, literature also warned of new risks associated with digital dependence—cybersecurity threats, data privacy issues, and platform monopolies. Small sellers reliant on dominant online marketplaces faced challenges in maintaining margins and autonomy. Hence, sustainability of e-commerce adoption required regulatory frameworks ensuring fairness and transparency.

VIII. Discussion Based on Research Objectives

The purpose of this discussion is to interpret the findings and conceptual implications of the study on the adoption of e-commerce by Small and Medium Enterprises (SMEs) and its resultant impact on business performance. The discussion aligns with the research objectives framed for the study, namely:

1. To examine the extent of e-commerce adoption among SMEs in India.
2. To analyze the determinants influencing e-commerce adoption decisions.
3. To evaluate the relationship between e-commerce adoption and business performance indicators.
4. To identify challenges and barriers faced by SMEs in adopting and sustaining e-commerce systems.
5. To propose strategic measures for enhancing e-commerce readiness and digital competitiveness among SMEs.

1. Extent of E-commerce Adoption among Indian SMEs

The first objective of this study focused on measuring the level and scope of e-commerce adoption among Indian SMEs. The discussion reveals that while a growing number of SMEs have recognized the potential benefits of e-commerce, the overall adoption rate remains uneven across sectors and regions. Service-oriented SMEs, particularly those involved in IT-enabled services, education, travel, and consultancy, have shown higher levels of digital integration compared to manufacturing or traditional trading units. This disparity is largely influenced by the degree of technological exposure, customer digital literacy, and access to infrastructure.

The empirical evidence from prior studies suggests that SMEs in metropolitan and tier-1 cities such as Delhi, Mumbai, and Bengaluru have a relatively mature digital ecosystem, facilitating smoother adoption processes. Conversely, SMEs in tier-2 and rural areas exhibit slower uptake due to infrastructural bottlenecks, higher cost of technology acquisition, and limited managerial awareness. The 2016 study findings further align

with theoretical postulates of the **Technology-Organization-Environment (TOE) framework**, where technological readiness and organizational capability are significant determinants of innovation adoption. The uneven diffusion of e-commerce in the Indian SME sector therefore illustrates a typical pattern of technological diffusion in developing economies, where innovation clusters first emerge in resource-rich regions before percolating into peripheral markets.

2. Determinants Influencing E-commerce Adoption

The second objective examines the key factors that influence the adoption of e-commerce within SMEs. Discussion based on the empirical framework shows that multiple dimensions—technological, organizational, and environmental—interact to shape the adoption behavior. Among the technological factors, **perceived usefulness, relative advantage, compatibility, and ease of use** emerge as critical motivators, consistent with the **Technology Acceptance Model (TAM)** and **Diffusion of Innovation (DOI)** theory. SMEs that perceive e-commerce as a cost-effective and customer-centric tool are more likely to implement digital solutions. Organizational readiness, including top management support, employee ICT competency, and financial capacity, also significantly determines adoption. Many SMEs in India operate with limited financial reserves and prioritize short-term survival over long-term technological investment, which constrains their ability to invest in e-commerce systems. Furthermore, managerial attitude plays a pivotal role in digital transition; decision-makers with a positive outlook toward innovation tend to allocate resources for training, software, and website development, leading to higher adoption rates. Environmental factors such as **competitive pressure, customer expectations, and government policies** equally influence adoption levels. The emergence of digital payment gateways post-2014, expansion of affordable internet services, and government initiatives like “Digital India” and “Make in India” have gradually improved the external environment for SMEs to integrate e-commerce. However, despite these enabling conditions, many firms continue to face uncertainties regarding cybersecurity, online fraud, and lack of consumer trust. Therefore, while technological and organizational readiness are vital internal enablers, environmental uncertainties often act as external constraints.

3. Relationship between E-commerce Adoption and Business Performance

The third research objective explored the relationship between the extent of e-commerce adoption and overall business performance. The discussion of findings indicates a strong positive correlation between the two. SMEs that actively utilize e-commerce platforms tend to report improved market access, enhanced customer satisfaction, and better operational efficiency. Online presence allows these enterprises to reach geographically dispersed customers, thereby expanding their sales base without proportional increases in physical infrastructure. E-commerce adoption has also been found to improve communication efficiency, inventory management, and supplier relationships. By digitalizing operations, SMEs reduce transactional costs, minimize inventory shortages, and optimize order processing cycles. In service sectors, e-commerce improves visibility and brand recognition, which enhances both customer acquisition and retention. The overall outcome is reflected in improved profitability, revenue growth, and market competitiveness. However, the discussion also identifies that the relationship between e-commerce adoption and business performance is **non-linear** and **context-dependent**. For SMEs with inadequate technological skills or improper strategy alignment, digital investment may not yield immediate returns. The performance improvement often depends on the firm’s capability to integrate online systems into broader value chain processes. Furthermore, while sales and marketing performance indicators show marked improvement, the impact on productivity and cost efficiency varies across industries. This aligns with earlier 2015–2016 research suggesting that while e-commerce adoption generates visible marketing and customer relationship benefits, operational efficiency gains require sustained digital maturity.

4. Barriers and Challenges to E-commerce Adoption

The fourth objective focuses on identifying the challenges that hinder e-commerce adoption and sustainability among SMEs. Findings indicate that barriers are multifaceted, encompassing **technical, financial, human resource, and infrastructural** constraints. One of the most cited challenges is the lack of technological knowledge and digital skills among SME owners and employees. Many small business operators lack awareness of online business models, cyber laws, and digital marketing tools, which creates apprehension toward adoption. Financial barriers also remain significant. Setting up an e-commerce platform requires initial investment in website development, software, cybersecurity, and logistics integration. For small enterprises with limited credit access, these costs can be prohibitive. Although government initiatives and microfinance institutions have begun offering digital transformation support, the coverage remains insufficient relative to demand. Trust and security issues constitute another major challenge. SMEs and consumers alike express concerns about online payment safety, data privacy, and transaction authenticity. In rural markets, low digital literacy amplifies these fears, reducing online engagement. Additionally, poor infrastructure—particularly unreliable broadband connectivity and logistics inefficiencies—hampers the smooth operation of e-commerce activities. From an organizational culture perspective, resistance to change also poses an obstacle. Traditional SMEs accustomed to physical sales

channels often perceive e-commerce as disruptive to existing relationships with local distributors. This psychological inertia leads to partial or hesitant adoption. Moreover, inadequate post-adoption support and absence of continuous digital strategy evaluation result in underutilization of e-commerce capabilities. Thus, the sustainability of adoption depends not merely on implementation but also on institutionalization within organizational routines.

5. Strategic Measures for Enhancing E-commerce Readiness

The fifth objective concerns developing strategic recommendations for strengthening e-commerce readiness and performance impact among SMEs. Based on the discussion, a multi-level strategy encompassing policy, organizational, and technological interventions is essential. At the **policy level**, continued support through the Digital India initiative and incentives for SME digitalization are vital. Government agencies should facilitate affordable access to broadband, provide training programs, and promote awareness of cybersecurity standards. Establishing regional e-commerce resource centers can help SMEs access shared digital infrastructure and advisory services. At the **organizational level**, SMEs must cultivate a digital mindset by encouraging managerial learning and employee skill enhancement. Investing in ICT training, developing internal innovation champions, and establishing performance metrics for online operations can enhance digital maturity. Integration of e-commerce strategies into broader business plans ensures coherence and sustainability. Strategic alliances with technology vendors and logistics partners can also mitigate financial and operational constraints. At the **technological level**, SMEs should adopt scalable, cloud-based e-commerce solutions that minimize upfront investment and offer flexibility. Data analytics tools should be leveraged to understand customer behavior and tailor marketing strategies accordingly. Enhanced use of social media platforms can amplify brand visibility and customer engagement, while mobile commerce can facilitate customer access in regions with limited desktop penetration.

6. Theoretical Implications

From a theoretical standpoint, this discussion reinforces the validity of multiple frameworks explaining technology adoption behavior. The **Technology Acceptance Model (TAM)**, **Diffusion of Innovation (DOI)**, and **Technology-Organization-Environment (TOE)** frameworks collectively offer comprehensive insights into how SMEs evaluate, adopt, and utilize e-commerce technologies. The integration of these models supports a holistic understanding that adoption is not driven solely by technological potential but also by managerial perception, organizational culture, and environmental readiness. Empirical findings further suggest that SMEs' e-commerce adoption behavior aligns with **innovation diffusion theory**, wherein early adopters play a crucial role in influencing peers within industry networks. This observation indicates a network spillover effect—firms that observe tangible benefits in competitors or partners are more likely to adopt e-commerce themselves. Therefore, fostering peer learning and demonstration projects could accelerate overall diffusion within SME sectors.

7. Practical Implications

Practically, the study provides actionable insights for policymakers, business owners, and technology providers. Policymakers should recognize SMEs as pivotal drivers of digital economy growth and design support mechanisms tailored to their unique constraints. Simplified digital onboarding processes, tax incentives for online sales, and public-private partnerships for logistics and payment solutions can stimulate wider adoption. For SME owners, the study emphasizes the importance of long-term digital planning rather than ad-hoc adoption. Successful e-commerce integration requires not only investment in technology but also in people and processes. Training employees, developing online customer service protocols, and monitoring website performance are crucial steps toward achieving sustained performance gains. Technology providers and service platforms can leverage this understanding to design affordable, user-friendly solutions customized for small enterprises. Local language interfaces, simplified dashboards, and bundled logistics support can significantly lower entry barriers. Moreover, platforms can facilitate trust by offering secure payment systems and buyer protection mechanisms, thereby building confidence among first-time users.

8. Addressing the Research Gaps

The study also highlights research gaps identified in the literature review. Most prior studies on e-commerce adoption were concentrated in developed economies, with limited focus on emerging markets like India, where institutional contexts differ markedly. There remains a paucity of longitudinal research tracking how e-commerce adoption evolves over time within SMEs and how sustained use affects firm performance dynamics. Another gap pertains to the measurement of performance outcomes. While most studies assess financial or marketing indicators, limited attention has been given to non-financial outcomes such as customer relationship quality, innovation capability, and employee learning. Future research should employ mixed-method approaches, combining quantitative metrics with qualitative insights to capture the nuanced effects of digital transformation.

Furthermore, cultural and behavioral factors influencing SME adoption decisions warrant deeper examination. The role of entrepreneurial orientation, risk perception, and local trust networks in shaping e-commerce readiness remains underexplored. Comparative studies across regions and sectors could yield more granular insights into context-specific drivers and inhibitors.

9. Implications for Future Research and Policy

Based on the identified gaps, future studies should extend beyond adoption antecedents to explore post-adoption performance trajectories. Researchers should employ longitudinal data to analyze how continuous engagement with e-commerce reshapes firm competitiveness and innovation capability. Cross-sectoral analyses may also reveal variations in digital transformation maturity. From a policy perspective, continuous monitoring of SME digitalization progress is necessary. Establishing a national digital maturity index for SMEs could assist in identifying lagging sectors and directing targeted interventions. Encouraging digital ecosystems through cluster-based initiatives and mentoring programs would enhance collective competitiveness.

IX. Conclusion

In conclusion, the discussion based on the research objectives underscores that e-commerce adoption has become a critical determinant of SME competitiveness in the contemporary Indian economy. The process, however, remains complex and uneven due to multifactorial influences. While technological and managerial readiness significantly enhance adoption likelihood, financial, infrastructural, and psychological barriers impede diffusion. Empirical evidence affirms that e-commerce adoption yields tangible performance benefits in terms of sales growth, market expansion, and customer engagement. Nonetheless, sustained gains depend on strategic alignment, digital literacy, and institutional support. The study thereby contributes to both academic and policy discourses by bridging the gap between theoretical constructs and real-world challenges faced by Indian SMEs in their journey toward digital transformation. Ultimately, fostering an enabling ecosystem—through technology accessibility, skill development, and trust enhancement—will determine the future trajectory of e-commerce-led SME growth. The findings align with broader national objectives of inclusive digital development, positioning SMEs as key stakeholders in India's transition to a knowledge-based and globally connected economy.

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