



Research Paper

Adoption of e-commerce by small & medium enterprises (SMEs) and its effect on business performance

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Abstract

The adoption of e-commerce by small and medium enterprises (SMEs) has emerged as a strategic imperative in the digital economy. This paper presents a comprehensive review of the literature (as of December 2018) on e-commerce adoption among SMEs and its effect on business performance. The study first examines drivers and barriers to e-commerce adoption, followed by models of adoption and stages of maturity. It then reviews empirical evidence linking e-commerce adoption to multiple dimensions of SME performance—financial, operational, customer and growth/learning. Thereafter, theoretical frameworks including the Resource-Based View (RBV), Diffusion of Innovation (DOI) and Technology–Organization–Environment (TOE) are applied to explain the adoption–performance linkage, and moderating/mediating factors such as innovation orientation, maturity and external readiness are discussed. The review reveals that although e-commerce adoption offers substantial performance benefits for SMEs, the benefits are neither automatic nor evenly distributed. Performance gains depend on depth of adoption, organisational capabilities, leadership support and external ecosystem readiness. Several research gaps are identified including a lack of longitudinal studies, objective performance metrics, mechanistic clarity and industry/context-specific investigation. Practical implications are drawn for SME managers, policy-makers and ecosystem actors. The conclusion summarises key findings and underscores the importance of treating e-commerce adoption as a capability-building process rather than a one-off technology implementation.

Keywords: SMEs, e-commerce adoption, business performance, drivers and barriers, adoption maturity, resource-based view, TOE framework

I. Introduction

In recent decades, the proliferation of digital technologies and internet connectivity has transformed how business is conducted globally. One of the most profound changes has been the rise of electronic commerce (e-commerce)—the use of the Internet and digital platforms for the buying, selling, marketing and servicing of products and services. For small and medium-sized enterprises (SMEs), e-commerce offers a potentially powerful channel through which they can compete, expand market reach, streamline operations, and enhance performance. At the same time, SMEs typically face unique resource constraints (financial, managerial, technological) and environmental barriers that may hinder e-commerce adoption. Understanding how SMEs adopt e-commerce, what drives adoption, and the effect on business performance is therefore critical both for academic inquiry and for policy/practice. In this context, Sedighi and Sirang's (2018) study "The Effect of E-Commerce on SME Performance" (published in *International Journal of Applied Research in Management and Economics*, 1(2), 71-81) provides important empirical evidence on how e-commerce adoption is linked to various performance dimensions of SMEs in Tehran, Iran. Their research, based on a sample of 373 SMEs and employing structural equation modelling, found that e-commerce usage is significantly effective on SME performance — encompassing financial performance, internal processes, customer dimensions, growth and learning.

Building on such foundational work, this introduction outlines the background and relevance of e-commerce adoption by SMEs, presents definitions and conceptual evolution, identifies key drivers and barriers, and articulates the relationship between e-commerce adoption and business performance. It then situates the problem, delineates research objectives and scope, and introduces the structure of the review.

Background and Relevance

SMEs constitute a vital component of national economies worldwide. They contribute significantly to employment, value-added, innovation and economic dynamism. However, many SMEs operate in highly

competitive, resource-constrained environments with limited scale, geographic reach and technological capability. The rapid growth of e-commerce offers SMEs an avenue to reduce some of these disadvantages: digital sales channels can bypass geographic boundaries; online marketing and logistics can permit leaner cost structures; customer analytics and digital payment mechanisms can improve responsiveness and service quality. From the literature, e-commerce has been characterised as a means for firms—especially SMEs—to transform their business model, improve operational efficiency, expand markets and enhance competitive positioning. For example, a study by Sharma (n.d./2019) argues that e-commerce adoption has helped SMEs open up new markets, increase revenues, streamline operations and compete on a more level playing field with larger firms. Meanwhile, research in developing economies indicates that e-commerce adoption is influenced by multiple factors (technological infrastructure, organisational readiness, environmental pressures) and is positively related to business performance. Given the digital shift in consumer and business behaviour, and the increasing penetration of internet-based commerce even in emerging markets, the adoption of e-commerce by SMEs has become a strategic imperative rather than a mere option. For policymakers, promoting SME e-commerce adoption holds the promise of enhancing national competitiveness, fostering inclusive growth, and raising SME productivity. At the firm level, understanding how adoption affects performance is critical for resource allocation, strategy formulation and capability development.

Definitions and Conceptual Evolution

E-commerce (electronic commerce) can be broadly defined as the process of buying, selling, transferring or exchanging products, services or information via computer networks, primarily the Internet. It encompasses business-to-consumer (B2C), business-to-business (B2B), consumer-to-consumer (C2C), and other models. In the context of SMEs, e-commerce usually refers to online sales channels, digital marketing, e-payments, online customer service, and supply-chain integration. **SMEs (Small and Medium Enterprises)** are defined differently across countries, but generally refer to firms with workforce size, turnover or balance sheet below certain thresholds. They are typically characterised by limited resources, flexibility, entrepreneurship orientation, and a closer link to local environments. Over time, the conceptualisation of e-commerce in SMEs has evolved: from early presence-only websites, to interactive portals, to fully transactional platforms, integrated supply-chain and digital-marketing systems. Research has shifted from simply whether SMEs adopt e-commerce, to how deeply they integrate it (maturity), what capabilities are required, and what outcomes accrue—especially in terms of business performance. Sedighi & Sirang (2018) build on this evolution: they conceptualise e-commerce adoption as a capability that affects multiple performance dimensions (financial, internal processes, customers, growth & learning) and consider that innovation moderates that effect. They thus treat e-commerce not merely as an isolated activity but as a strategic enabler of SME performance.

Key Drivers and Barriers for SME E-commerce Adoption

In the literature, many studies have examined the antecedents of e-commerce adoption by SMEs. Factors commonly identified include:

- **Technological readiness:** availability of ICT infrastructure, internet connectivity, systems, and skilled personnel. For example, the study of Malaysian SMEs found that personal, technological, organisational and environmental variables account for adoption variance.
- **Organisational characteristics:** top-management support, innovation orientation, firm size, internal processes, resource availability. Sedighi & Sirang (2018) note that resource limitations typically faced by SMEs (especially financial/infrastructural) hamper adoption.
- **Environmental/contextual factors:** competitive pressure, supplier/customer pressure, regulatory frameworks, culture/trust, market dynamics. For example, emerging-economy barriers include weak regulatory frameworks and low trust in e-commerce.
- **Innovation/learning orientation:** the attitudes of owner/managers, willingness to change, previous IT usage, strategic vision. In the Sedighi & Sirang model, innovation moderated the e-commerce–performance relationship.
- **Cost considerations:** Implementation costs, training costs, maintenance costs, security/security concerns are often cited as barriers for SMEs.
- **Trust and security issues:** Especially in emerging markets, lack of customer trust, absence of legal-regulatory support, and cybersecurity concerns inhibit e-commerce.
- **Market/consumer readiness:** The extent to which customers are willing to transact online, logistics/delivery infrastructure, payment systems, all matter.
- **Strategic orientation:** SMEs with proactive strategy, market orientation and digital mindset are more likely to adopt e-commerce and harness its benefits.

Understanding these drivers and barriers is important because the effect of e-commerce adoption on performance is not automatic—it depends on how well SMEs manage these antecedents and embed e-commerce effectively.

E-Commerce Adoption and Business Performance: Theoretical Linkages

The relationship between e-commerce adoption and SME business performance is often explained via a number of theoretical perspectives:

- **Resource-Based View (RBV):** According to RBV theory, firms that can develop unique and in-imitable resources (e.g., digital capabilities, e-commerce platforms, online brand presence) can secure competitive advantage and improved performance. In the context of SMEs, e-commerce adoption can be a resource/capability that enhances operational efficiency, access to markets, customer interface, and hence performance. (Sedighi & Sirang refer to growth & learning, internal processes, customers, financial performance).
- **Diffusion of Innovation (DoI) / Technology Adoption Models:** These frameworks explain how and why firms adopt innovations (e-commerce) and how such adoption impacts outcomes. For example, adoption speed, extent of usage, perceived benefits vs perceived barriers affect performance gains.
- **Value Chain / Operational Efficiency Perspective:** E-commerce adoption can streamline internal processes (order management, inventory, logistics), reduce transaction costs, improve customer interactions, thereby augmenting performance.
- **Market Expansion / Competitive Advantage Perspective:** By leveraging e-commerce, SMEs can expand beyond local markets, access new customer segments, enhance customer satisfaction and loyalty, thus improving revenue growth, market share and profitability.

Empirical studies lend support to positive links: For example, Sedighi & Sirang (2018) found significant effects of e-commerce on performance dimensions for SMEs in Tehran. Other studies in different countries (e.g., Indonesia: Memarista et al., 2021) show that e-commerce usage improved financial performance, internal process, customer satisfaction, growth and learning. However, the strength of effect varies depending on adoption maturity, firm resources, external context, and moderating variables like innovation or entrepreneurial competencies.

Therefore, while adoption of e-commerce holds clear potential for improving SME business performance, the actual realized effect depends on multiple contingencies—extent of usage, integration into firm operations, managerial capabilities, and external environment.

Research Problem, Objectives & Significance

Problem Statement: Despite the appealing promise of e-commerce, many SMEs continue to lag in adoption or fail to realize performance benefits. Resource constraints, technological gaps, organisational inertia, environmental barriers and limited strategic vision often impede effective adoption. Thus, there is a need to understand how e-commerce adoption influences SME performance and what factors moderate/mediate this linkage.

Objectives:

1. To examine the extent to which SMEs adopt e-commerce (in terms of digital sales channels, online marketing, e-payment/fulfillment)
2. To assess the effect of e-commerce adoption on different dimensions of SMEs' performance (financial, internal processes, customer, growth & learning)
3. To identify the key drivers and barriers influencing e-commerce adoption in SMEs
4. To investigate moderating or mediating variables (such as innovation orientation, managerial competence, external environment) that affect the e-commerce–performance relationship
5. To derive implications for SME managers, policy-makers and ecosystems to enhance SME e-commerce adoption and performance.

Significance of the Study:

- **For SMEs:** Provides insight into how investment in e-commerce may yield performance improvements, and what conditions enhance success.
- **For Managers:** Helps prioritise strategic enablers (digital capabilities, innovation, customer orientation) and address barriers in adoption.
- **For Policy-Makers:** Offers evidence for designing support infrastructure (digital infrastructure, training, regulations, incentives) to foster SME digitalisation and competitiveness.
- **For Academia:** Fills gaps in empirical understanding of e-commerce adoption and performance, especially in SME context and in emerging economies, and tests theoretical linkages (e.g., RBV, DOI) in SME environment.

II. Literature Review on E-commerce Adoption by SMEs – Drivers/Barriers, Models of Adoption, Adoption Maturity

The rapid growth in internet penetration, mobile connectivity and digital platforms has fundamentally altered the business environment in which small and medium enterprises (SMEs) operate. Within that shift, the adoption of electronic commerce (e-commerce) — defined broadly as the use of networked information and communication technologies (ICT) for business transactions, marketing, customer service, and supply-chain integration — has attracted extensive scholarly attention (e.g., Turban, 2010; Tagliavini et al., 2001, cited in Purnomo et al., 2016). For SMEs, which are often resource-constrained relative to large firms, e-commerce adoption offers the potential to expand market reach, reduce transaction costs, enhance customer responsiveness and improve internal processes. At the same time, SMEs face unique hurdles in adopting and integrating e-commerce into their operations. This section reviews the extant literature on e-commerce adoption by SMEs, structured into three subparts: (a) drivers and barriers to adoption, (b) models of adoption (including frameworks applied in SME contexts), and (c) adoption maturity – stages and levels of e-commerce utilisation.

2.1 Drivers and Barriers of E-commerce Adoption by SMEs

A substantial body of empirical work has identified both facilitating factors (drivers) and inhibiting influences (barriers) affecting SME e-commerce adoption. On the driver side, relative advantage or perceived benefits of e-commerce (e.g., extended market reach, increased sales, improved customer service, enhanced image) consistently emerge as positive influences (e.g., Legohérel & Lane, 2010; Purnomo et al., 2016). For example, a study of Indonesian SMEs found that the top perceived benefits of e-commerce included extending market reach, increased sales, improved external communication, improved company image, speed of processing and increased employee productivity. Research also highlights compatibility (fit with business processes), top-management support, organisational readiness (in terms of skills, resources, and culture), and competitive pressure as key drivers. For example, a Malaysian study found that among SMEs in Malaysia's Klang Valley region, relative advantage, compatibility, top management support and knowledge/resources had significant positive impacts on e-commerce adoption, while complexity and resource constraints were not statistically significant in that context. From the barrier perspective, several recurring themes appear: limited financial and technological resources, lack of ICT infrastructure, deficient managerial knowledge/skills, security and trust concerns, absence of supportive regulatory/legal frameworks, low customer readiness (especially in emerging markets), and organisational inertia (e.g., Dubelaar et al., 2005; Kotelnikov, 2007; Purnomo et al., 2016). For instance, in developing-country contexts, SMEs often report that “e-commerce does not offer any advantages to our organization” or that the legal/regulatory environment is weak for online transactions. Emerging-economy research reinforces that the owner-manager's characteristics (innovative orientation, ICT proficiency, awareness of e-commerce) are crucial; the absence of these individual-level drivers can strongly hamper adoption (Hyder & Lussier, 2016; Raza et al., 2018, as referenced in Mechman et al., 2022). In sum, the drivers/barriers framework shows that e-commerce adoption by SMEs is influenced by multi-level factors: technological, organisational and environmental (or external) factors.

2.2 Models of Adoption in SME E-commerce Research

To explain how and why SMEs adopt e-commerce, the literature has applied several theoretical frameworks. Two of the most prominent are the Technology–Organization–Environment (TOE) framework, and diffusion/acceptance models (e.g., Technology Acceptance Model (TAM), Diffusion of Innovation (DOI)).

- The TOE framework posits that adoption is influenced by three contexts: technological (available technologies, complexity, compatibility), organisational (size, resources, culture, top management support), and environmental (industry characteristics, competition, regulatory environment, government support). Numerous SME studies apply TOE to e-commerce adoption. For example, Yadav & Mahara (2018) studied Indian handicraft SMEs and found that technological, organisational and strategy factors significantly contributed to initial e-commerce adoption in the wooden handicraft SMEs of Saharanpur, Uttar Pradesh.

- The TAM (and extended versions) emphasises perceived usefulness and perceived ease of use of the technology, often augmented with external variables like knowledge, resources, top management support. For instance, a systematic review of TAM in SME e-commerce found that many studies incorporate external variables beyond the core TAM constructs.

- The DOI model conceptualises adoption as a process of diffusion, where factors such as relative advantage, compatibility, complexity, trialability and observability shape the rate of adoption. Some e-commerce studies among SMEs deploy DOI to analyse adoption progression (e.g., Bahaddad et al., 2015).

- Some research integrates TOE with DOI or TAM (hybrid models) to explain not only adoption intention but also depth of usage and performance outcomes.

In addition to the adoption models, a smaller but growing literature examines adoption maturity or stage models: how far the SME has moved beyond initial adoption to fuller integration and value realisation.

2.3 Adoption Maturity – Stages and Levels of E-commerce Utilisation

Adoption maturity refers to the degree to which e-commerce technologies are embedded, used, and integrated within an organisation's operations rather than merely adopted superficially. Understanding maturity is important because the mere act of adopting e-commerce does not guarantee performance gains; the depth and sophistication of usage matter. For example, Purnomo et al. (2016) define levels of e-commerce adoption among Indonesian SMEs in a five-stage model: stage 0 (no internet/no email), stage 1 (e-mail only, no website), stage 2 (static website), stage 3 (interactive website but no transaction), stage 4 (web site allowing business transaction) and stage 5 (integrated website). Their survey of 292 Indonesian SMEs found that while 92.8 % had email/internet access, only 13 % were at stage 4 and only 1 firm reached stage 5 (integrated website) in the sample. Their results also indicated that SMEs at higher levels of adoption reported greater benefits (e.g., extending market reach, increased sales) than those at lower levels of adoption, although statistical significance was mixed. This implies that adoption maturity moderates the relationship between e-commerce adoption and performance benefits.

Other studies on SME e-commerce adoption similarly find that many SMEs remain at low maturity levels – for instance, using e-commerce mainly for digital marketing or communications rather than full transactional integration or supply-chain linkage (e.g., Kurnia et al., 2014, cited in Malaysian grocery SME study). In summary, the literature indicates that SMEs' e-commerce adoption should not be treated as a binary (adopt/non-adopt) but rather as a continuum of maturity, where deeper integration tends to generate more value. Thus, the review of drivers/barriers, adoption models, and maturity levels provides a comprehensive foundation for examining how e-commerce adoption unfolds among SMEs and how it might influence performance. The next section turns to empirical evidence of the effect of e-commerce adoption on SME performance.

III. Empirical Evidence of E-commerce Adoption's Effect on SME Performance – Summarising Key Studies (Including Sedighi & Sirang, 2018) and Synthesising Findings

While a large body of research has focused on why SMEs adopt e-commerce and what drives or impedes adoption, the downstream question of what effect e-commerce adoption has on business performance has been comparatively less widely studied—particularly in emerging economies and among SMEs. This section reviews key empirical studies, including the seminal work by Sedighi and Sirang (2018), summarises findings across contexts, and synthesises lessons for SME performance outcomes.

3.1 Key Study: Sedighi & Sirang (2018)

One of the notable published studies is by Amir Sedighi and Behroz Sirang (2018) titled “The Effect of E-Commerce on SME Performance”. The study surveyed 373 managers of SMEs in Tehran, Iran, using a descriptive-correlative design. They deployed a questionnaire (based on Soto-Acosta et al., 2015) and analysed data using structural equation modelling (PLS). Their findings indicate that e-commerce usage is significantly effective on SME performance. Specifically, e-commerce application has a significant effect on four performance elements: financial performance, internal business processes, customers, and growth & learning. Furthermore, they found that the relationship between e-commerce and performance (and its constituent elements) is moderated by innovation—that is, SMEs with higher levels of innovation orientation achieved better performance from their e-commerce adoption.

This study thus provides robust empirical evidence from a developing-country SME context that e-commerce can enhance multiple dimensions of performance, conditional on organisational factors like innovation.

3.2 Other Empirical Studies

In addition to the Iranian study, several other empirical investigations provide evidence on e-commerce adoption and SME performance, across countries and contexts. In Indonesia, Purnomo et al. (2016) found that SMEs with higher levels of e-commerce adoption (e.g., transactional websites) reported greater benefits (extended market, increased sales, improved communications) though these benefits were self-reported and statistical significance varied. In India, Yadav & Mahara (2018) conducted a study of wooden-handicraft SMEs in Saharanpur, Uttar Pradesh, and found that technological, organisational and strategy factors influenced e-commerce adoption. While their primary focus was on adoption rather than performance outcomes, it suggests the potential for performance gains if adoption is achieved. Other studies such as Mechman et al. (2022) (though later than 2018) and Widiyanti et al. (2023) indicate that digital literacy, government support and organisational readiness moderate the adoption–performance link (though again beyond the 2018 timeframe). While not all studies provide rigorous statistical analysis linking e-commerce adoption to performance, the emerging pattern is that adoption is associated with performance improvements, especially when adoption is deep (high maturity) and organisational readiness is strong.

3.3 Synthesising Findings

From the empirical evidence we can draw several key insights:

1. **Positive relationship between e-commerce adoption and SME performance:** The Sedighi & Sirang (2018) study provides one of the most direct links: e-commerce usage significantly affects financial performance, internal processes, customer dimension, growth & learning. Other studies confirm similar patterns qualitatively or via self-report.
2. **Multiple performance dimensions:** Performance benefits are not confined to increased sales or revenue; they extend to improved internal business processes (efficiency, cost reduction), enhanced customer engagement and satisfaction, organisational learning/growth, and market expansion. For instance, Purnomo et al. (2016) report extended market reach and increased productivity as benefits.
3. **Moderating/mediating role of organisational factors:** The performance impact depends on internal factors such as innovation orientation (Sedighi & Sirang, 2018), top-management support, digital literacy, resources, and adoption maturity. These factors strengthen or weaken the adoption–performance linkage.
4. **Maturity matters:** SMEs with higher levels of e-commerce adoption (i.e., moving beyond static website to transactional/integrated platforms) tend to garner greater benefits. The Purnomo et al. (2016) findings illustrate that benefit means increase with adoption stage.
5. **Contextual variation:** The magnitude of effect and the ease of achieving adoption and performance vary by geography, industry, and institutional context. For example, SMEs in emerging economies face more barriers (infrastructure, regulation, trust) which may dampen performance benefits.
6. **Causality and measurement challenges:** Many studies rely on cross-sectional survey data, self-reported perceived benefits, and adoption intention rather than longitudinal measures of actual performance change. This limits the strength of causal claims.
7. **Gap for integrative performance models:** While adoption–performance links are evident, fewer studies examine precisely how e-commerce translates into value (through process change, supply-chain integration, customer analytics) or the ROI for SMEs.

In short, the empirical body of work as of December 2018 suggests that SME adoption of e-commerce can yield substantial performance benefits—but these gains are neither automatic nor uniform. Success depends on organisational readiness, adoption depth, and contextual enablers. The next section turns to theoretical frameworks to better understand these linkages.

IV. Theoretical Frameworks Linking E-commerce Adoption and SME Performance (RBV, DOI etc.) and Discussion of Moderating/Mediating Factors

Understanding how and why e-commerce adoption affects SME performance benefits from anchoring in relevant theoretical frameworks. This section outlines key theories applied in the literature, and discusses how moderating and mediating factors intervene in the adoption–performance relationship for SMEs.

4.1 Resource-Based View (RBV)

The Resource-Based View (RBV) of the firm posits that competitive advantage stems from valuable, rare, inimitable and non-substitutable (VRIN) resources and capabilities that relate to firm performance (Barney, 1991). In the context of SMEs adopting e-commerce, e-commerce capabilities (digital infrastructure, online channel management, customer analytics, logistical integration) can constitute strategic resources. When an SME develops and embeds such resources, it may gain improved operational efficiency, expanded market access, customer differentiation and cost leadership, leading to improved performance.

For example, when SMEs build online sales channels, digital marketing competence and integration with supply chain, they transform e-commerce adoption into a capability that supports internal processes, customer dimension and growth — aligning with Sedighi & Sirang's (2018) finding that e-commerce usage affects internal processes and growth/learning.

Under RBV, the value of adoption depends not only on implementing technology, but on how well the firm embeds, configures and leverages the capability. Thus, maturity and organisational readiness are critical. Moreover, the resource-constraint nature of SMEs (limited manpower, funding, skills) means that e-commerce adoption must be seen as capability development, not merely as technology deployment.

4.2 Diffusion of Innovation (DOI) and Technology Acceptance

The DOI model (Rogers, 2003) explains how, why and at what rate innovations spread through organisations/groups. Its constructs—relative advantage, compatibility, complexity, trialability, observability—are frequently applied to e-commerce adoption by SMEs. For example, research finds relative advantage (e-commerce benefits), compatibility (alignment with business model), and complexity (difficulty of use)

significantly affect adoption intention and depth. (e.g., Zainuddin et al., 2018 in Malaysia) Technology Acceptance Model (TAM) focuses on perceived usefulness and perceived ease of use as determinants of technology adoption (Davis, 1989). Many SME e-commerce studies adapt TAM plus external variables (resources, top management support) to explain adoption decision (e.g., Hadian et al., 2023) Hence, DOI/TAM frameworks provide insight into adoption processes, but less directly into performance outcomes. When linked with maturity constructs, they help explain how far firms progress in e-commerce use and how that translates into performance.

4.3 Linking Adoption to Performance: An Integrated View

Bridging RBV and DOI/TAM, one can articulate a chain: technological/organisational/environmental antecedents → e-commerce adoption (extent, maturity) → capability development (digital capabilities, process re-engineering, customer integration) → business performance. Under this integrated view, adoption is necessary but insufficient; the competitive value stems from how the firm leverages the resource/capability enabled by e-commerce. Within this framing, some key moderating and mediating factors are identified in the literature:

4.3.1 Moderating Factors

- **Innovation orientation:** Sedighi & Sirang (2018) found that innovation moderated the relationship between e-commerce adoption and performance—SMEs with higher innovation orientation achieved stronger performance gains.
- **Adoption maturity:** The level of e-commerce maturity influences performance outcomes; higher maturity confers greater benefits. As shown by Purnomo et al. (2016).
- **Top management support:** High support from leadership enhances the translation of adoption into performance.
- **External environmental readiness:** e-commerce infrastructure, legal/regulatory environment, customer readiness moderate the adoption–performance link. In emerging economies, weaker external readiness can dampen performance gains.

4.3.2 Mediating Factors

- **Digital capability development:** After adoption, the extent to which SMEs develop new capabilities (digital marketing, supply-chain integration, customer analytics) mediates the effect of adoption on performance.
- **Process re-engineering / internal change:** Adoption often triggers changes to internal processes (order management, inventory, logistics) which then lead to efficiency gains and performance improvements.
- **Customer engagement and satisfaction:** Enhanced customer interface via e-commerce may mediate the impact on revenue growth and market share. In Sedighi & Sirang's (2018) model, internal process and customer performance elements serve as mediators between e-commerce adoption and growth/learning and financial outcomes.

4.4 Implications of Frameworks for SMEs

From a theoretical perspective, these frameworks suggest that SMEs seeking performance improvement via e-commerce must focus on three interlinked domains: (1) adoption of appropriate technology (guided by DOI/TAM), (2) building internal capabilities (RBV), and (3) adapting organisational and environmental readiness (top management support, resources, external infrastructure). Adoption alone is a necessary but not sufficient condition for performance enhancement; maturity and capability embedding are critical. Furthermore, firms in resource-constrained SME settings must prioritise building a replicable capability rather than merely implementing a website or online shop.

Thus, the theoretical groundwork underscores why some SMEs adopt e-commerce but fail to achieve performance benefits—because they may stop at adoption without capability development, or operate in weak external environments, or lack leadership support.

In the next section, we examine gaps in the literature, future research directions, and practical implications for SMEs and policy.

V. Gaps in Literature, Directions for Future Research, Practical Implications for SMEs and Policy

5.1 Gaps in the Literature

While research on SME e-commerce adoption and performance has progressed, several notable gaps remain as of 2018:

1. **Longitudinal studies and causality:** Many studies rely on cross-sectional survey data and self-reported measures of perceived benefits rather than objective performance metrics or longitudinal tracking of performance change over time. This limits the ability to infer causality between e-commerce adoption and performance outcomes.
2. **Depth of maturity and integration:** While stage models exist, few studies explicitly examine how depth of adoption (transactional integration, supply-chain linkage, digital analytics) influences performance in SMEs, especially in emerging economies.
3. **Context-specific research in emerging economies:** Much of the e-commerce adoption research has been conducted in developed country settings; fewer studies focus on SMEs in developing nations where constraints (infrastructure, regulation, trust) are more acute (Purnomo et al., 2016).
4. **Measurement of performance dimensions:** Performance is often measured via proxies (e.g., perceived sales increase) rather than using multidimensional performance metrics (financial, operational, customer, growth/learning). Sedighi & Sirang (2018) make a useful contribution, but more studies replicating multidimensional performance measurement are needed.
5. **Mechanisms of value creation:** There is limited understanding of the exact mechanisms by which e-commerce adoption leads to performance improvement—how internal process changes, customer engagement, supply-chain integration, business model innovation mediate the effect.
6. **Moderation/mediation effects:** Though some studies (e.g., Sedighi & Sirang) examine moderators (innovation) or mediators (internal process) others lack rich exploration of such effects, especially in SME environments.
7. **Industry-specific and size-specific dynamics:** SMEs are heterogeneous; the dynamics of e-commerce adoption and performance may vary by industry, company size, growth orientation, and ownership structure (e.g., family business). More fine-grained research is needed.
8. **Policy and ecosystem factors:** While some studies examine environmental readiness (regulation, infrastructure), fewer assess how government policy, platform ecosystems, training programmes, or public-private partnerships influence adoption and performance outcomes at the SME level.

5.2 Directions for Future Research

Given the above gaps, the following directions for future research are recommended:

- Conduct longitudinal panel studies of SMEs to track e-commerce adoption, maturity progression and performance outcomes over time—allowing stronger causal inference.
- Develop and test refined maturity models tailored for SMEs, distinguishing levels of integration (marketing only; transactional; full supply-chain digitalisation) and examine how higher maturity links to performance.
- Use objective performance metrics (e.g., revenue growth, profit, cost reduction, market share) and multi-dimensional performance frameworks (financial, internal process, customer, learning/growth) to enhance validity and comparability.
- Investigate the mechanism of value creation: identify mediators such as process re-engineering, digital marketing capability, customer relationship management, supply-chain integration, business model innovation.
- Explore moderating influences more widely: owner/manager ICT literacy, organisational culture, industry digital readiness, platform ecosystem membership, government support.
- Examine context-specific factors in developing economies: infrastructure constraints, regulatory/legal frameworks, trust and consumer behaviour, logistics/delivery systems.
- Conduct comparative studies across industries and geographies to examine how industry digitalisation, SME size, ownership (family vs non-family), maturity stage affect adoption-performance link.
- Assess policy and ecosystem interventions: government digitalisation programmes, SME training and support, platform partnerships (e.g., e-marketplaces), to identify what external interventions accelerate adoption and performance outcomes.

5.3 Practical Implications for SMEs and Policy Makers

For SMEs (managers and owners):

- Recognise that adopting e-commerce is not simply about setting up a website or online shop; performance gains arise when e-commerce is embedded into business processes, supported by leadership, skills and learning orientation.
- Evaluate organisational readiness: assess management support, employee skills, digital infrastructure, customer readiness, and select appropriate adoption level aligned with strategy.
- Consider maturity: plan for progression from basic online presence to interactive/transactional e-commerce and eventually full integration (logistics, supply-chain, analytics).
- Build digital capabilities: invest in digital marketing, customer relationship management, supply-chain coordination and analytics rather than only channel presence.
- Monitor and measure performance across multiple dimensions (not only sales but efficiency, customer satisfaction, growth/learning) and link these metrics to digital investments.
- Leverage external support: engage with digital platform providers, government programmes, training opportunities, peer networks.

For policy makers and ecosystem actors:

- Recognise SMEs contribute significantly to employment, innovation and economic growth; accelerating their digitalisation via e-commerce can therefore have broader economic benefits.
 - Develop supportive infrastructure: ensure robust internet connectivity, secure payment systems, logistics/delivery networks and regulatory/legal frameworks conducive to e-commerce (especially in developing economies). For example, studies highlight weak regulatory frameworks as a barrier in emerging economies.
 - Provide capacity-building programmes: train SME owners/managers in digital skills, e-commerce models, business process integration and platform usage.
 - Facilitate platform partnerships and marketplaces that allow SMEs to join e-commerce ecosystems with lower entry barriers.
 - Offer financial/incentive support: subsidies, grants or low-interest credit for SMEs to adopt e-commerce technologies or hire digital talent.
 - Promote awareness: disseminate success stories and case-studies of SMEs achieving benefits from e-commerce, to reduce adoption hesitation and increase organisational innovativeness.
- By implementing both firm-level and ecosystem-level strategies, SMEs and policy stakeholders can maximise the potential of e-commerce to improve business performance.

VI. Conclusion Summarising Key Takeaways

The adoption of e-commerce by SMEs represents a strategic opportunity in the evolving digital business environment. This paper has reviewed the literature on drivers and barriers of e-commerce adoption, adoption models and maturity levels (Section 2), presented empirical evidence of how adoption affects SME business performance (Section 3), and elaborated theoretical frameworks (RBV, DOI/TAM) plus moderating/mediating factors that explain the adoption–performance linkage (Section 4). Section 5 highlighted gaps in the literature, proposed future research directions and outlined practical implications for SMEs and policy makers.

Key takeaways are as follows:

- SMEs face both promising opportunities and significant challenges in adopting e-commerce. Drivers such as perceived relative advantage, compatibility, top management support and organisational readiness enhance the likelihood of adoption, while barriers such as limited resources, infrastructure gaps, security/trust concerns and weak regulatory frameworks inhibit it.
- Models such as TOE, TAM and DOI help explain adoption decisions; maturity models further refine understanding by showing that adoption is a continuum and higher maturity typically leads to greater benefits.
- Empirical evidence (notably Sedighi & Sirang, 2018) indicates that e-commerce adoption can positively impact multiple dimensions of SME performance—financial, internal processes, customer, growth/learning—but these outcomes are contingent on organisational innovation and maturity.
- Theoretically, adopting e-commerce becomes a strategic capability (RBV lens) when embedded in operations and properly leveraged; adoption alone is insufficient. Moderating/mediating factors (innovation orientation, maturity, external environment, capability development) play a central role.
- Research gaps remain: in longitudinal measurement, objective performance metrics, mechanism of value creation, context variation, industry-specific dynamics and external policy/eco-system interventions. Addressing these gaps will strengthen both academic insight and practical guidance.

- For SMEs and policy makers, the practical message is that e-commerce should be viewed not simply as a technology adoption but as a transformative business capability requiring planning, capability-building, measurement, and ecosystem support.

In conclusion, e-commerce adoption holds real potential for SMEs to enhance business performance—if consciously managed, integrated, and supported. As digitalisation accelerates globally, SMEs that move beyond mere adoption towards maturity and capability building are more likely to realise sustainable performance gains. This paper therefore underscores the importance of a holistic, capability-centric view of e-commerce adoption in SMEs, bridging adoption decision, maturity progression and performance outcomes.

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