University of Economics in Katowice

Journal of Economics and Management

Vol. 48 • 2026

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From E-commerce adoption to continuance: The role of dynamic capability in Indonesian SMEs

Accepted by Editor Ewa W. Ziemba | Received: May 19, 2026 | Revised: September 3, 2026; September 23, 2026 | Accepted: October 8, 2026 | Published: November 4, 2026.

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Cite as: Religia, Y., Ambarwati, S. D. A., & Huda, M. (2026). From E-commerce adoption to continuance: The role of dynamic capability in Indonesian SMEs. *Journal of Economics and Management, 48*, 479-514. https://doi.org/10.22367/jem.2026.48.18

Abstract

Aim/purpose – This study examines how the technological, organizational, and environmental contexts of the technology-organization-environment (TOE) framework are associated with the extent of e-commerce adoption (EA) among digitally active small and medium-sized enterprises (SMEs) and how the extent of adoption is associated with e-commerce continuance (EC), directly and indirectly through dynamic capability (DC), in Indonesia.
Design/methodology/approach – A cross-sectional survey was conducted with 144 SME owners and managers in the Special Region of Yogyakarta, Central Java, and West Java who had prior or current experience with online marketing or e-commerce. We purposively selected respondents and analyzed the data using PLS-SEM in SmartPLS 4.0.
Findings – Organizational and environmental contexts are positively and significantly associated with the extent of EA, whereas technological context (TE) is not significant.

Adoption extent is positively associated with DC and EC, and DC is also positively associated with continuance. The indirect effect of adoption extent on continuance through DC is statistically significant.
Research implications/limitations – The findings support an integrative post-adoption perspective that distinguishes adoption extent from continuance and highlights the statistical role of DC. Because the study is cross-sectional and uses a purposive sample of digitally active SMEs from three Indonesian regions, causal inference and empirical generalization are limited.
Originality/value/contribution – This study integrates the TOE framework and DC theory to examine adoption-related contextual conditions, adoption extent, DC, and post-adoption continuance within one model, offering evidence from resource-constrained SMEs in a developing-economy context.

Keywords: E-commerce adoption, e-commerce continuance, dynamic capability, Technology–Organization–Environment (TOE) framework, Indonesian SMEs.
JEL Classification: L2, M2, M3, O3.
Article type: Original article.

1. Introduction

Digital technologies and small and medium-sized enterprises (SMEs) have become central to contemporary economic development. In Indonesia, SMEs account for approximately 64.2 million business units, contribute more than 61 percent to national GDP, and employ nearly 97 percent of the workforce, making them a major pillar of the national economy (Novitasari et al., 2025). At the same time, Indonesia's e-commerce transaction value reached IDR 1,288 trillion in 2024, indicating substantial opportunities for digitally enabled SMEs (BPS-Statistics Indonesia, 2025). Nevertheless, these opportunities have not been fully translated into comprehensive SME digital integration. Only about 39.7 percent of SMEs have entered the digital ecosystem (Rizky et al., 2025), while large-scale trade still largely dominates e-commerce transactions. In addition, only about 17 percent of businesses use marketplace platforms, and many SMEs still rely on instant messaging applications for digital transactions (BPS-Statistics Indonesia, 2025). This pattern reflects SMEs' limited resources, owner-centered decision-making, informal routines, uneven digital literacy, and restricted access to digital infrastructure in developing economies. Such conditions may increase exposure to fraud and operational inefficiency, particularly when transactions occur through informal digital channels with limited safeguards (Tajudeen et al., 2025).

This situation highlights a critical issue in SME digitalization: beyond deciding to use e-commerce, SMEs may differ substantially in how actively, consistently, and intensively they incorporate e-commerce into their business activities. Prior adoption is necessary for continuance, but it does not guarantee that SMEs will maintain, deepen, or embed e-commerce in business processes over time. Among SMEs that have already entered the digital-use stage, variation in current adoption and use may therefore be particularly relevant for understanding subsequent continuance and post-adoption adaptation (Arshad et al., 2025). Accordingly, the present study focuses not on explaining the binary decision to adopt versus not adopt e-commerce, but on explaining variation in the extent of EA among digitally active SMEs and its association with post-adoption continuance.

We have used several theoretical perspectives to explain SME EA, including diffusion of innovation, the resource-based view, the technology acceptance model, the unified theory of acceptance and use of technology, and the technology-organization-environment (TOE) framework. Among these, TOE is widely recognized as a comprehensive organizational-level framework because it simultaneously captures technological, organizational, and environmental conditions (Awa et al., 2017; Daoud & Kammoun, 2024; Muafi et al., 2024). Tornatzky and Fleischer (1990) introduced TOE, which proposes that technology adoption is associated with technological, organizational, and environmental conditions. This framework is particularly relevant for SMEs in developing countries because it simultaneously considers internal organizational conditions and external environmental pressures associated with technology adoption and use (Daoud & Kammoun, 2024; Hussain et al., 2026).

Despite its explanatory utility, TOE-based e-commerce research has often emphasized the contextual conditions associated with technology adoption while offering less explanation of post-adoption adaptation and sustained use (Abbes, 2025; Religia et al., 2025; Singh et al., 2025). This limitation becomes particularly relevant once SMEs have already entered the digital-use stage, because differences in the extent of EA do not necessarily correspond to differences in sustained post-adoption use. TOE therefore provides a useful basis for examining adoption-related contextual conditions, but it needs an additional theoretical perspective to explain how adaptive organizational capabilities relate to EC.

Dynamic capability theory (DCT) provides a complementary lens to address this limitation. DCT emphasizes the firm's ability to build, integrate, and reconfigure resources in response to environmental change (Teece et al., 1997). Through sensing, seizing, and transforming capabilities, firms are better positioned to identify digital opportunities, mobilize resources, and reconfigure business processes in changing environments (Teece, 2007). In the SME e-commerce context, DCT provides a useful lens for examining whether SMEs with stronger adaptive capabilities also exhibit stronger post-adoption continuance. Integrating DCT with TOE therefore provides a theoretical basis for examining associations among adoption-related contextual conditions, adaptive capability, and sustained e-commerce use without assuming these cross-sectional associations imply a temporal causal sequence.

Although prior studies have examined EA using TOE and have increasingly recognized the relevance of DC, further evidence is needed on how adoption-related contextual conditions, the extent of EA, DC, and post-adoption continuance are connected within a single empirical model. This issue is particularly relevant for SMEs that have already entered the digital-use stage, for which the important question is no longer simply whether e-commerce has been adopted, but how extensively it is used and how such use is associated with sustained post-adoption engagement (Awa et al., 2017; Muafi et al., 2024; Ocloo et al., 2025). This study addresses this issue by integrating TOE and DCT and examining DC as a statistical pathway linking the extent of EA with EC.

Accordingly, this study examines an integrative model combining the TOE framework and DCT among Indonesian SMEs with prior or current digital-use experience. Specifically, the study examines:

1) whether technological, organizational, and environmental contexts are associated with the extent of EA,
2) whether the extent of EA is associated with DC and EC, and
3) whether DC is associated with EC and whether there is a positive indirect association between the extent of EA and continuance through DC.

Indonesia provides a meaningful setting because its SMEs are largely micro and small firms operating under resource constraints, uneven digital readiness, and reliance on informal digital channels (BPS-Statistics Indonesia, 2025). These conditions reflect resource-constrained and informality-based SME digitalization (Astuti, 2025), making it relevant to examine whether sustained

e-commerce use is associated not only with the extent of digital engagement but also with SMEs' adaptive capacity to reconfigure limited resources and routines. The study includes business location as a control variable to account for potential regional differences among SMEs in the Special Region of Yogyakarta, Central Java, and West Java. These theoretically specified relationships are operationalized through hypotheses H1-H7, which form the study's hypothesis-based research framework.

This study contributes to the literature in three ways. First, it adds empirical evidence to the growing post-adoption literature by distinguishing the extent of EA among digitally active SMEs from EC. Second, rather than extending TOE as a standalone framework, the study integrates TOE with DCT to examine associations among adoption-related contextual conditions, the extent of EA, DC, and post-adoption continuance. Third, it provides empirical evidence from resource-constrained SMEs in Indonesia, offering a context-specific basis for further examination and replication in other developing-economy settings. Accordingly, the study's broader relevance is primarily theoretical and comparative rather than evidence of empirical generalizability beyond the sampled SMEs.

The remainder of the article is organized as follows. Section 2 develops the theoretical background and hypotheses; Section 3 describes the research methodology; Section 4 presents the empirical results; Section 5 discusses the findings and their implications; and Section 6 presents the study limitations, directions for future research, and conclusion.

2. Literature review and hypothesis development

2.1. E-commerce adoption and continuance in SMEs

E-commerce refers to business transactions that involve buying and selling goods or services through internet-based digital platforms (Ocloo et al., 2025). Conceptually, the literature distinguishes the decision to adopt a digital technology from its subsequent use and continuance (Nguyen & Ha, 2021; Osatuyi & Qin, 2018). However, the present study did not examine the binary distinction between adopters and non-adopters because the empirical sample included SMEs with prior or current experience in online marketing or e-commerce. Accordingly, this study operationalized EA as the extent to which businesses adopted and used e-commerce. It was reflected in formal adoption commitment, current active and consistent use, the proportion of

products or services marketed or sold through e-commerce, and the frequency of e-commerce transactions (Arshad et al., 2025; Awa et al., 2017; Muafi et al., 2024). However, prior adoption does not necessarily translate into sustained post-adoption use, as SMEs may discontinue e-commerce due to limited digital skills and uneven access to internet, logistics, and financial infrastructure (Ariansyah et al., 2021; Osatuyi & Qin, 2018).

EC represents a conceptually related but distinct post-adoption construct. In this study, continuance was operationalized as SMEs' sustained commitment to e-commerce and the extent to which they maintained and embedded its use in business activities. It was reflected in the decision to continue using e-commerce in the future, long-term commitment, perceived post-adoption benefits and satisfaction, and deeper integration and reliance on e-commerce in core business and sales processes (Arinto et al., 2026; Sultana et al., 2025). Thus, while the adoption construct captured the actual extent and intensity of EA among existing users, the continuance construct captured sustained post-adoption commitment and embeddedness. The two constructs were therefore conceptually related but distinct and were not treated as equivalent.

This distinction was important for interpreting the empirical model. Prior adoption was a prerequisite for continuance, but the EA construct used in the present study did not represent that initial adoption decision. Instead, it examined whether variation in the extent of adoption among digitally active SMEs was associated with variation in DC and EC. Because we measured these constructs cross-sectionally, we interpreted their relationships as theoretically specified associations rather than observed temporal stages.

2.2. TOE framework and e-commerce adoption

The TOE framework provides an organizational-level perspective for examining the technological, organizational, and environmental conditions associated with technology adoption (Tornatzky & Fleischer, 1990). In the present study, these contexts were not used to explain a binary adopter versus non-adopter decision. Instead, because the sample consisted of SMEs with prior or current digital-use experience, we examined the TOE contexts in relation to variation in the extent of EA among existing users (Daoud & Kammoun, 2024; Hussain et al., 2026). Within this framework, technological context (TE) referred to the perceived char-

acteristics of the technology being adopted, including relative advantage, compatibility, and ease of use (Awa et al., 2017; Religia et al., 2025). Among SMEs that already used digital channels, favorable perceptions of relative advantage, compatibility, and ease of use could also be associated with more extensive and consistent e-commerce use (Awa et al., 2017; Ocloo et al., 2025). Therefore, the following hypothesis was proposed:

H1: TE is positively associated with the extent of EA among digitally active SMEs.

The organizational context (OR) reflects SMEs' internal readiness to support technology adoption. This includes top management support, organizational readiness, and the availability of information technology skills (Ocloo et al., 2025; Religia et al., 2025). In SMEs, owner or managerial support influences how much time, attention, and organizational effort are devoted to e-commerce activities. In the present study, organizational readiness reflected the availability of sufficient time to manage e-commerce activities. In contrast, IT skill availability reflected owners' and business teams' ability to operate digital technologies and manage e-commerce platform accounts and features. These organizational conditions may therefore be associated with more extensive and consistent e-commerce use among SMEs that have already entered the digital-use stage (Giang et al., 2025; Ocloo et al., 2025). Thus, the following hypothesis was formulated:

H2: OR is positively associated with the extent of EA among digitally active SMEs.

The environmental context (EN) concerns external pressures and market conditions that influence SMEs' technology adoption. Competitive pressure and customer pressure are particularly relevant because SMEs increasingly operate in markets where competitors use digital channels, and customers expect online transactions (Ocloo et al., 2025; Rahayu & Day, 2015). Among digitally active SMEs, stronger competitive and customer pressures may be associated with more extensive e-commerce engagement as firms respond to changing market expectations and competitive dynamics (Muafi et al., 2024; Ocloo et al., 2025). Prior studies have similarly identified environmental conditions as important correlates of SME EA and digital use (Awa et al., 2017; Nguyen et al., 2024). Accordingly, the following hypothesis was proposed:

H3: EN is positively associated with the extent of EA among digitally active SMEs.

2.3. E-commerce adoption and dynamic capability

DCT provides a basis for expecting a positive association between the extent of EA and DC among SMEs. DC refers to firms' ability to build, integrate, and reconfigure resources in response to changing environments (Teece et al., 1997), while sensing, seizing, and transforming capture the ability to recognize opportunities, mobilize responses, and adjust organizational resources and processes (Al Jabri et al., 2024; Teece, 2007). In the e-commerce context, more extensive and consistent digital engagement may be associated with greater interaction with digital customers, accumulated platform-use experience, and access to market information. Such engagement may also be observed alongside stronger abilities to identify digital opportunities, respond to emerging market possibilities, and adjust organizational resources and business routines (Albimani et al., 2025; Shu & Srimuang, 2026; Sun et al., 2024). Prior studies similarly associated digitalization and DC with organizational adaptation in changing environments (Nasution et al., 2021; Vo Thai et al., 2024). Taken together, these theoretical arguments provided a basis for expecting a positive relationship between the extent of EA and DC. However, given the present study's cross-sectional design, we tested this theoretical expectation as an association rather than as evidence that EA temporally develops DC. Therefore, the following hypothesis was proposed:
H4: The extent of EA is positively associated with DC among SMEs.

2.4. Integrating TOE, DCT, and e-commerce continuance

Integrating the TOE framework and DCT provides a complementary perspective on EA and continuance. TOE provides a basis for examining technological, organizational, and environmental conditions associated with the extent of EA, whereas DCT provides a basis for examining adaptive capability associated with sustained technology use (Teece, 2007; Teece et al., 1997; Tornatzky & Fleischer, 1990). In the present cross-sectional model, we integrated these theories to examine how adoption-related contextual conditions, the extent of EA, DC, and EC were statistically connected, rather than to establish a temporal causal sequence (Lim et al., 2021; Okoye et al., 2023). Within this integrative perspective, DC provides a theoretical basis for examining variation in EC. SMEs with stronger DC, reflected in sensing, seizing, and transforming capabilities, may be better positioned to identify digital market opportunities, respond to changing customer

preferences, and reconfigure limited resources in ways that are compatible with sustained e-commerce use (Al Jabri et al., 2024; Vo Thai et al., 2024). Accordingly, stronger DC is expected to be associated with stronger commitment to maintaining and embedding e-commerce in business activities. Therefore, the following hypothesis was proposed:

H5: DC is positively associated with EC among SMEs.

Prior EA is a necessary prerequisite for continuance, because a firm cannot continue using a technology that it has not previously adopted. However, prior adoption does not guarantee sustained use. Accordingly, the empirical purpose of H6 was not to test whether adoption is required for continuance, but to examine whether SMEs that report a greater extent of current EA and use also report stronger post-adoption continuance. More extensive and consistent e-commerce engagement may be associated with greater familiarity with online transactions, stronger commitment to digital channels, and deeper incorporation of e-commerce into business activities (Arinto et al., 2026; Nguyen & Ha, 2021; Osatuyi & Qin, 2018; Sultana et al., 2025). Thus, within a sample of existing digital users, the extent of current EA was expected to be positively associated with the strength of post-adoption continuance. Therefore, the following hypothesis was formulated:

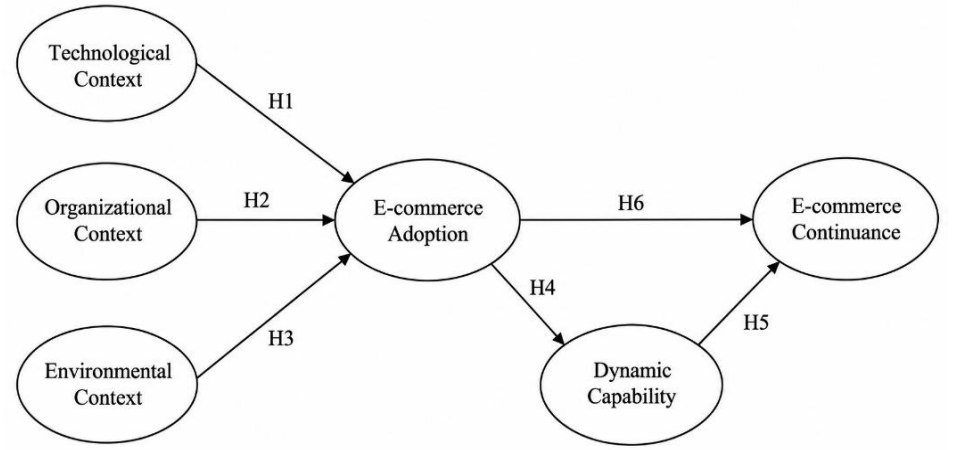
H6: Among SMEs that have adopted e-commerce, a greater extent of EA is positively associated with EC.

The association between the extent of EA and continuance may also involve DC. SMEs reporting more extensive e-commerce engagement may simultaneously report stronger abilities to sense digital opportunities, seize emerging possibilities, and reconfigure business processes, while these adaptive capabilities may in turn be associated with stronger EC (Albimani et al., 2025; Nasution et al., 2021; Shu & Srimuang, 2026; Sun et al., 2024). This theoretical reasoning suggests a positive indirect statistical pathway connecting the extent of EA with continuance through DC. Because the data were cross-sectional, we should not interpret such an indirect association as evidence that DC temporally or causally mediated the adoption–continuance relationship. The hypothesis therefore concerned the statistical significance and direction of the indirect association rather than a causal mediation process. Thus, the following hypothesis was proposed:

H7: There is a positive indirect association between the extent of EA and EC through DC.

The hypothesized associations are summarized in Figure 1.

Figure 1. Hypothesis framework



Note: H7 represents the hypothesized positive indirect association between the extent of EA and EC through DC. H7 is therefore represented by the combined H4 and H5 paths rather than by a separate direct path. Business-location controls are omitted from the hypothesis framework for clarity but are included in the structural model estimation.

Source: Authors' own elaboration.

3. Methodology

This study employed a quantitative cross-sectional survey design to examine theoretically specified associations among TOE contexts, the extent of EA, DC, and EC among SMEs. Because all central constructs were measured at a single point in time, the estimated structural paths and indirect effects are interpreted as statistical associations rather than evidence of temporal or causal relationships. The unit of analysis was the firm, represented by SME owners or managers directly involved in business operations and digital marketing decisions.

The target population consisted of SMEs with prior or current experience in online marketing or e-commerce. The empirical setting covered SMEs located in the Special Region of Yogyakarta, Central Java, and West Java. We purposively selected these three regions because they have relatively high concentrations of SMEs and comparatively developed digital and e-commerce activity within Java. Collectively, they also provide variation in socioeconomic characteristics and digital infrastructure relevant to examining EA and continuance among digitally active SMEs (Fizzanty & Maulana, 2024; Verawaty et al., 2023). Other major regions of Java were not included because the empirical scope was predefined around

the three regions in which eligible digitally active SMEs could be purposively accessed through the study's SME training and mentoring networks. The regional sampling frame aimed to capture contextual variation within the study's scope rather than provide statistically representative estimates for Java or Indonesia. The study used purposive sampling because it required respondents with direct experience in EA and use. More specifically, the sampling strategy was intended to capture variation in the extent of EA and post-adoption continuance among existing digital users. Inclusion criteria were SME owners or managers, businesses operating in one of the selected regions (the Special Region of Yogyakarta, Central Java, or West Java), and prior or current use of online marketing or e-commerce for marketing and/or sales activities.

All constructs were measured using multi-item scales adapted from prior studies and adjusted to the SME e-commerce context. We used a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. We adjusted the wording of the adapted measures to ensure the statements were understandable and contextually applicable to SME e-commerce practices while preserving the conceptual meaning of the source measures. Appendix A provides the full wording of the retained measurement items, their conceptual domains, and item-level sources to facilitate evaluation of measurement content and construct differentiation.

Before the main survey, we pre-tested the questionnaire with 35 SMEs to assess item clarity, relevance, validity, and contextual relevance. The initial instrument contained seven technological-context items, six organizational-context items, and six environmental-context items. Following the pilot evaluation, we removed five items before the main survey. In the pilot assessment, we retained items with outer loadings above 0.50 and removed those below this threshold. In the TE, TE7 ("Easy E-commerce Transaction Management"), which represented the ease-of-use domain, did not meet this criterion and was therefore removed. In the OR, we removed OR5 ("Owner Involvement in Decisions"), representing top management support, and OR6 ("Sufficient Operational Funds"), representing organizational readiness, for the same reasons. In the EN, we removed EN5 ("Access to Digital Training") and EN6 ("Government Support for Digitalization"), which represented the government-support domain, on contextual-relevance grounds. The research team conducted the contextual-relevance assessment for EN5 and EN6 based on feedback from the 35 pilot respondents and supplemented it with expert judgment. Details of the pilot-test item

refinement and the basis for item removal are provided in Appendix B. The pilot evaluation indicated substantial variation among SMEs in their exposure to and utilization of government digitalization programs, making government support difficult to capture consistently as part of the EN in this sample. The final environmental-context construct therefore focused on competitor pressure and customer pressure (Fizzanty & Maulana, 2024). The refined instrument was subsequently used in the full-scale survey.

We collected primary data from April 20 to May 8, 2026, using a structured questionnaire distributed during SME training and mentoring activities in the selected regions. SME mentors assisted only as access facilitators and questionnaire distributors because of their direct engagement with SME communities. To reduce social desirability bias, respondents were informed that participation was voluntary, refusal would not affect access to mentoring or training programs, and there were no right or wrong answers. They were also assured that individual responses would remain anonymous and confidential and would be used solely for academic purposes. Formal ethical approval was not required for this non-interventional survey study, as determined by the Research and Community Service Institute (LPPM), Universitas Pembangunan Nasional "Veteran" Yogyakarta (Determination Letter No. 154a/UN62.21/PG.00.01/2026). The mentors did not evaluate, interpret, or influence respondents' answers. Although the training and mentoring networks facilitated access to SMEs meeting the study criteria, this recruitment channel may have produced a sample with relatively greater exposure to business-development programs, digital information, or organizational support than SMEs that do not participate in such activities. We therefore considered this potential selection effect when interpreting the findings and acknowledged it as a boundary of the study.

A total of 170 questionnaires were distributed across the three study regions: 60 to SMEs in Central Java, 60 to SMEs in West Java, and 50 to SMEs in the Special Region of Yogyakarta. We received 150 questionnaires, representing a response rate of 88.2%. After data screening, we excluded three responses due to incomplete data and removed three others because respondents did not meet the study's digital-use eligibility criterion. Consequently, 144 valid responses were retained for final analysis, corresponding to a usable response rate of 84.7% relative to the questionnaires distributed. We evaluated sample-size adequacy using a statistical power analysis in G*Power. The analysis used a linear multiple regression, fixed model, R^2 deviation from zero specification, with a medium effect size of

$f^2 = 0.15$, a significance level of $\alpha = 0.05$, statistical power of 0.95, and five predictors, corresponding to the maximum number of predictors directed at an endogenous construct in the revised model. Under these assumptions, the power analysis indicated a sample-size benchmark of 138 observations. The final analyzable sample of 144 therefore supported the adequacy of the planned analysis. The distribution of 170 questionnaires also accounted for nonresponse and unusable responses.

We measured the TE using relative advantage, compatibility, and ease of use (Awa et al., 2017; Religia et al., 2025). OR was measured using top management support, organizational readiness, and IT skill availability (Ocloo et al., 2025; Religia et al., 2025). EN was measured through competitor pressure and customer pressure (Ocloo et al., 2025; Rahayu & Day, 2015). We measured the extent of EA using indicators reflecting formal adoption commitment, current active and consistent use, product or service coverage, and transaction frequency (Arshad et al., 2025; Awa et al., 2017). The DC construct was measured through indicators covering the conceptual domains of sensing, seizing, and transforming capabilities (Al Jabri et al., 2024; Teece, 2007), while EC was measured through future continuance and long-term commitment, perceived post-adoption benefits and satisfaction, and usage depth reflected in business-process integration and reliance on e-commerce (Arinto et al., 2026; Sultana et al., 2025).

We specified TE, OR, EN, EA, DC, and EC as first-order reflective latent constructs. The dimensional labels used during instrument development served as conceptual domains for indicator selection and content coverage rather than as separately estimated latent dimensions. Specifically, TE was represented by indicators covering relative advantage, compatibility, and ease of use; OR by top management support, organizational readiness, and IT skill availability; EN by competitor pressure and customer pressure; EA by formal adoption commitment, current active and consistent use, product or service coverage, and transaction frequency; DC by sensing, seizing, and transforming; and EC by future continuance, long-term commitment, perceived post-adoption benefits and satisfaction, and deeper integration and reliance on e-commerce in business activities. Accordingly, the study focuses on the overall latent construct represented by the corresponding indicators rather than on dimension-specific structural effects. No higher-order component model was estimated for any of the six constructs. Under this reflective specification, the observed indicators were treated as manifestations of their corresponding latent constructs. Although EA and EC were both modeled reflectively, they were treated as conceptually distinct constructs:

EA captures the current extent and intensity of adoption among SMEs that have already entered the digital-use stage, whereas EC captures sustained post-adoption commitment and embeddedness. This distinction provides the basis for interpreting their structural association without treating the cross-sectional measures as observed temporal stages.

Business location was included as a categorical control variable rather than as a single ordinal variable. Because Central Java, West Java, and the Special Region of Yogyakarta represent nominal categories, location was represented using two dummy variables in the revised structural model, with the Special Region of Yogyakarta serving as the reference category (Central Java: 1 = Central Java, 0 = otherwise; West Java: 1 = West Java, 0 = otherwise; Special Region of Yogyakarta: both dummies = 0). Data were analyzed using partial least squares structural equation modeling (PLS-SEM) with SmartPLS 4.0. Following Hair et al. (2021), we assessed the measurement model using indicator loadings, internal consistency reliability, composite reliability, average variance extracted, indicator-level collinearity (VIF), and discriminant validity (HTMT criterion). The structural model was evaluated using collinearity diagnostics, path coefficients, bootstrapped t-values, p-values, R^2, and predictive relevance Q^2. In addition, we examined adjusted R^2 and effect sizes (f^2) to provide a more complete assessment of the structural model. Inner VIF values were used to assess collinearity among the predictor constructs. Q^2 values above zero were interpreted as indicating predictive relevance within the estimated PLS-SEM model rather than out-of-sample predictive performance.

We evaluated the indirect association between EA and EC through DC using bootstrapping rather than interpreting it as evidence of causal mediation. Statistical significance for H1–H7 was assessed using 10,000 bootstrap subsamples. Because all substantive hypotheses specified positive directional associations a priori, we applied one-tailed tests at the 5% significance level, accompanied by 90% percentile bootstrap confidence intervals based on the 5th and 95th percentiles. The specific indirect effect was used to assess H7.

Potential common method bias was assessed using two complementary statistical diagnostics. First, construct-level full-collinearity VIFs were obtained by regressing each focal construct on the remaining focal constructs using the construct scores. Values below 3.3 were treated as indicating that pathological col-

linearity was unlikely (Kock, 2015). Second, Harman's single-factor test was conducted using all 32 retained measurement items in an unrotated principal component analysis. We used a first-factor variance below 50% as additional evidence that a single common factor did not dominate the observed covariance.

4. Results

4.1. Respondent characteristics

Table 1 summarizes the demographic and business characteristics of the 144 respondents. Female respondents constituted the majority, accounting for 59.7% of the sample, compared with 40.3% male respondents. Most respondents had a bachelor's degree (49.3%), followed by senior high school education (24.3%), postgraduate education (16.7%), and diploma education (9.7%). The sample consisted mainly of SMEs selling self-produced products (64.6%), followed by service businesses (20.8%) and SMEs selling products from other SMEs (14.6%). Respondents were distributed across Central Java, West Java, and the Special Region of Yogyakarta at 37.5%, 31.3%, and 31.3%, respectively. In terms of business maturity, 47.2% of the SMEs had operated for more than five years. Most firms employed fewer than six workers: 48.6% employed one to three workers, and 39.6% employed four to six workers.

Table 1. Respondent characteristics

Characteristics	N	%
Gender		
Female	86	59.7
Male	58	40.3
Education level		
Bachelor's degree	71	49.3
Senior high school	35	24.3
Postgraduate	24	16.7
Diploma	14	9.7
Type of business		
Selling self-produced products	93	64.6
Selling services	30	20.8
Selling products from other SMEs	21	14.6

Table 1 cont.

Characteristics	N	%
Business location		
Central Java	54	37.5
West Java	45	31.3
Special Region of Yogyakarta	45	31.3
Operational duration		
> 5 years	68	47.2
1 to 3 years	35	24.3
3 to 5 years	34	23.6
< 1 year	7	4.9
Number of employees		
1 – 3 employees	70	48.6
4 – 6 employees	57	39.6
> 6 employees	17	11.8

Note: Senior high school refers to upper-secondary education; diploma refers to post--secondary vocational higher education below the bachelor's level; bachelor's degree refers to an undergraduate university degree; and postgraduate refers to master's or doctoral-level education in the Indonesian education system.

Source: Authors' own elaboration.

4.2. Outer model evaluation

We assessed the measurement model before evaluating the structural model to ensure all constructs met the required standards of validity and reliability. Following the PLS-SEM assessment procedure, the evaluation covered indicator reliability, convergent validity, internal consistency reliability, multicollinearity, and discriminant validity using factor loadings, average variance extracted (AVE), Cronbach's alpha (CA), composite reliability (CR), variance inflation factor (VIF), and the heterotrait–monotrait ratio (HTMT) criterion (Hair et al., 2021).

As reported in Table 2, all indicator loadings were above the recommended threshold of 0.700, ranging from 0.740 to 0.864. This indicates that the indicators adequately reflected their respective latent constructs and were appropriate for retention in the model. Convergent validity was also confirmed, as all AVE values exceeded 0.500, with values ranging from 0.648 for OR to 0.709 for DC. These results show that each construct explained more than half

of the variance in its indicators. The reliability results further demonstrated satisfactory internal consistency. Cronbach's alpha values ranged from 0.818 to 0.918, while composite reliability values ranged from 0.880 to 0.936, all surpassing the minimum recommended value of 0.700. Thus, the constructs showed acceptable to strong reliability without evidence of excessive indicator redundancy. Indicator-level collinearity was examined using outer VIF values. The results showed that all VIF values ranged from 1.537 to 2.877, remaining below the commonly accepted threshold. Therefore, the measurement model showed no problematic indicator-level collinearity.

Table 2. Model measurement results (Loading, VIF, AVE, CA, CR)

Constructs	Item*)	Loading	VIF	AVE	CA	CR
Technological context (TE)	TE1	0.809	2.062	0.665	0.899	0.922
	TE2	0.840	2.436			
	TE3	0.815	2.051			
	TE4	0.853	2.689			
	TE5	0.804	2.173			
	TE6	0.768	1.937			
Organizational context (OR)	OR1	0.740	1.537	0.648	0.818	0.88
	OR2	0.807	1.700			
	OR3	0.810	1.742			
	OR4	0.858	1.990			
Environmental context (EN)	EN1	0.857	2.119	0.680	0.843	0.894
	EN2	0.859	2.170			
	EN3	0.831	1.857			
	EN4	0.747	1.574			
E-commerce adoption (EA)	EA1	0.790	1.955	0.656	0.895	0.920
	EA2	0.795	2.045			
	EA3	0.864	2.877			
	EA4	0.854	2.594			
	EA5	0.796	2.149			
	EA6	0.756	1.842			
Dynamic capability (DC)	DC1	0.824	2.230	0.709	0.918	0.936
	DC2	0.854	2.671			
	DC3	0.861	2.589			
	DC4	0.844	2.662			
	DC5	0.823	2.250			
	DC6	0.844	2.421			

Table 2 cont.

Constructs	Item*)	Loading	VIF	AVE	CA	CR
E-commerce continuance (EC)	EC1	0.839	2.483	0.689	0.910	0.930
	EC2	0.822	2.590			
	EC3	0.831	2.428			
	EC4	0.832	2.420			
	EC5	0.811	2.003			
	EC6	0.845	2.624			

Note: *) = Appendix A; CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; VIF = variance inflation factor. All six focal constructs were specified as first-order reflective constructs. Conceptual-domain information is provided in Appendix A.

Source: Authors' own elaboration.

Discriminant validity was assessed using the HTMT criterion. As shown in Table 3, all HTMT values were below the conservative threshold of 0.850, with the highest value of 0.575 observed between DC and EC. This confirms that TE, OR, EN, EA, DC, and EC were empirically distinct constructs. Overall, the measurement model demonstrated adequate reliability, convergent validity, discriminant validity, and no problematic multicollinearity, making it suitable for subsequent evaluation of the structural model.

Table 3. Results of the HTMT

Constructs	1	2	3	4	5	6
1. Technological context (TE)	–					
2. Organizational context (OR)	0.424	–				
3. Environmental context (EN)	0.449	0.512	–			
4. E-commerce adoption (EA)	0.386	0.502	0.568	–		
5. Dynamic capability (DC)	0.266	0.421	0.567	0.550	–	
6. E-commerce continuance (EC)	0.301	0.402	0.515	0.490	0.575	–

Source: Authors' own elaboration.

Potential common method bias was also assessed using construct-level full-collinearity VIFs. The values were 1.299 for TE, 1.412 for OR, 1.724 for EN, 1.672 for EA, 1.718 for DC, and 1.582 for EC. All values were below the recommended threshold of 3.3. Harman's single-factor test further showed that the first unrotated factor accounted for 34.652% of the total variance, below the 50% criterion. Taken together, these diagnostics suggest that common method variance was unlikely to be a dominant concern in the model. Construct-level and item-level descriptive statistics are reported in Appendix C.

4.3. Inner model evaluation and hypothesis testing

We evaluated the structural model after establishing adequate measurement model quality. Structural collinearity was first assessed using inner VIF values. The values ranged from 1.021 to 1.411, indicating no problematic collinearity among the predictor constructs. The model explained 34.1% of the variance in EA (R^2 = 0.341; adjusted R^2 = 0.317), 25.5% of the variance in DC (R^2 = 0.255; adjusted R^2 = 0.239), and 33.8% of the variance in EC (R^2 = 0.338; adjusted R^2 = 0.319). The corresponding Q^2 values were 0.207 for EA, 0.165 for DC, and 0.216 for EC, all above zero.

As reported in Table 4, TE was positively but not significantly associated with the extent of EA (β = 0.130, t = 1.455, p = 0.073, 90% CI [−0.011, 0.285], f^2 = 0.040); therefore, H1 was not supported. OR was positively and significantly associated with EA (β = 0.222, t = 2.755, p = 0.003, 90% CI [0.098, 0.363], f^2 = 0.066), supporting H2. EN was also positively and significantly associated with EA (β = 0.359, t = 3.929, p < 0.001, 90% CI [0.205, 0.507], f^2 = 0.146), supporting H3.

Table 4. Hypothesis testing results

Hypothesis & relationship	β	t-value	p-value	90% CI	f^2	Supported
H1: TE → EA	0.130	1.455	0.073	[−0.011, 0.285]	0.040	No
H2: OR → EA	0.222	2.755	0.003	[0.098, 0.363]	0.066	Yes
H3: EN → EA	0.359	3.929	<0.001	[0.205, 0.507]	0.146	Yes
H4: EA → DC	0.501	6.545	<0.001	[0.370, 0.620]	0.330	Yes
H5: DC → EC	0.415	5.070	<0.001	[0.279, 0.549]	0.194	Yes
H6: EA → EC	0.251	3.062	0.001	[0.113, 0.383]	0.070	Yes
H7: EA → DC → EC	0.208	3.751	<0.001	[0.123, 0.304]	–	Yes
Control variable						
Central Java → EA	−0.155	0.878	0.190	[−0.440, 0.144]	0.006	–
West Java → EA	0.162	0.855	0.196	[−0.138, 0.483]	0.006	–
Central Java → DC	−0.055	0.309	0.379	[−0.348, 0.238]	0.001	–
West Java → DC	0.009	0.045	0.482	[−0.304, 0.328]	0.000	–
Central Java → EC	−0.034	0.188	0.425	[−0.340, 0.255]	0.000	–
West Java → EC	−0.153	0.806	0.210	[−0.462, 0.162]	0.005	–

Note: Bootstrap = 10,000 subsamples. For the directional hypotheses H1-H7, one-tailed inference at the 5% significance level was applied, with 90% percentile bootstrap confidence intervals (5th–95th percentiles). Business-location controls were non-hypothesized and were interpreted descriptively with reference to their coefficients and bootstrap confidence intervals. Special Region of Yogyakarta = reference category. R^2/ Adjusted R^2/ Q^2: EA = 0.341/ 0.317/ 0.207; DC = 0.255/ 0.239/ 0.165; EC = 0.338/ 0.319/ 0.216.

Source: Authors' own elaboration.

The extent of EA was positively associated with DC (β = 0.501, t = 6.545, p < 0.001, 90% CI [0.370, 0.620], f^2 = 0.330), supporting H4. DC was positively associated with EC (β = 0.415, t = 5.070, p < 0.001, 90% CI [0.279, 0.549], f^2 = 0.194), supporting H5. The direct association between the extent of EA and EC was also positive and statistically significant (β = 0.251, t = 3.062, p = 0.001, 90% CI [0.113, 0.383], f^2 = 0.070), supporting H6. Finally, the specific indirect association between EA and EC through DC was positive and statistically significant (β = 0.208, t = 3.751, p < 0.001, 90% CI [0.123, 0.304]), supporting H7. Consistent with the cross-sectional design, this result is reported as a statistically significant indirect association rather than evidence of causal mediation.

With the Special Region of Yogyakarta serving as the reference category, none of the business-location control paths were statistically significant. The coefficients were β = −0.155 for Central Java → EA (p = 0.190), β = 0.162 for West Java → EA (p = 0.196), β = −0.055 for Central Java → DC (p = 0.379), β = 0.009 for West Java → DC (p = 0.482), β = −0.034 for Central Java → EC (p = 0.425), and β = −0.153 for West Java → EC (p = 0.210). The bootstrap confidence intervals for all six control paths included zero. These results indicate that the two location controls were not significantly associated with the endogenous constructs in the estimated model; they should not be interpreted as evidence of regional invariance or structural stability across the three regions.

5. Discussion and implications

5.1. Discussion

The findings provide a differentiated picture of EA and continuance among digitally active SMEs. Both OR and EN are significantly associated with EA, whereas TE is not. The extent of EA is positively associated with DC and continuance, while a statistically significant indirect association between EA and continuance was observed through DC. These findings reflect cross-sectional associations rather than evidence of a temporal transition from adoption to continuance.

The non-significant association between TE and the extent of EA requires careful interpretation. TOE-based studies commonly emphasize relative advantage, compatibility, and ease of use as determinants of technology adoption (Awa et al., 2017; Daoud & Kammoun, 2024; Ocloo et al., 2025). However, these

attributes did not explain statistically significant variation in adoption extent in the present sample and showed only a small effect size ($f^2 = 0.040$). A relevant consideration is that the sample consisted exclusively of SMEs with prior or current digital-use experience. This sampling condition may have reduced variation in perceptions of basic technological advantages, compatibility, and ease of use, making these technological characteristics less differentiating among existing users. Thus, technological attributes may remain relevant enabling conditions, but they did not significantly differentiate the extent of EA within the present sample. Importantly, the result does not demonstrate that TE is unimportant for EA generally. The present study cannot determine whether technological conditions play a stronger role in distinguishing adopters from non-adopters because the sample includes only adopters.

The positive association between OR and adoption extent highlights the relevance of internal organizational conditions. SMEs are commonly characterized by centralized decision-making, limited resources, and dependence on owners or managers. Under these conditions, owner support, time available to manage e-commerce, and digital skills become key organizational conditions associated with more extensive e-commerce use. This result is consistent with prior studies showing that top management support, organizational readiness, and IT capability are central to SME digital adoption (Giang et al., 2025; Hussain et al., 2026; Religia et al., 2025). Although the relationship was statistically significant, its effect size was relatively small ($f^2 = 0.066$), indicating that OR represents one contributing source of variation rather than a dominant explanation of adoption extent. Accordingly, organizational readiness remains relevant for explaining variation in adoption extent among SMEs that have already entered the digital-use stage.

The EN is significantly associated with the extent of EA, indicating that competitive and customer pressures remain relevant sources of variation among digitally active SMEs. As customers increasingly expect online interaction, product information, and transaction convenience, SMEs may report more extensive e-commerce use in response to these market conditions. This finding aligns with previous studies indicating that competitive and customer pressures can encourage e-commerce and digital channel adoption (Muafi et al., 2024; Ocloo et al., 2025; Rahayu & Day, 2015). EN showed the strongest association with adoption among the three TOE contexts ($\beta = 0.359$; $f^2 = 0.146$), although its effect size remained slightly below the conventional benchmark for a medium effect. Taken

together, the findings for organizational and environmental contexts indicate that variation in adoption extent is associated with both internal organizational conditions and external market pressures among digitally active SMEs.

A central finding is the positive association between EA and DC. SMEs reporting more extensive and consistent e-commerce use also reported stronger sensing, seizing, and transforming capabilities. The relationship was the strongest substantive structural association in the model ($\beta = 0.501$; $f^2 = 0.330$). DCT argues that firms need to build, integrate, and reconfigure resources in response to changing environments (Teece, 2007; Teece et al., 1997). This association aligns with the proposition that digital engagement and adaptive organizational capabilities are closely connected. This interpretation is consistent with studies linking digitalization and DC to SME adaptation and performance in changing environments (Nasution et al., 2021; Vo Thai et al., 2024). However, the cross-sectional design does not establish whether more extensive e-commerce use develops DC, whether firms with stronger DC use e-commerce more extensively, or whether the relationship is reciprocal.

DC is also significantly associated with EC. SMEs reporting stronger DC also reported stronger EC ($\beta = 0.415$; $f^2 = 0.194$), indicating a moderate association between adaptive capability and sustained post-adoption use. Continuance therefore reflects sustained commitment and deeper integration of e-commerce into business activities, not merely repeated use. EA extent also retained a positive direct association with continuance ($\beta = 0.251$; $f^2 = 0.070$). Together, these findings support the conceptual distinction between current adoption extent and sustained post-adoption continuance while showing that the two constructs remain positively related. This view is consistent with the argument that post-adoption behavior depends on perceived benefits, learning, adaptation, and continued commitment to technology use (Arinto et al., 2026; Nguyen & Ha, 2021; Osatuyi & Qin, 2018; Sultana et al., 2025).

Finally, the statistically significant indirect association between adoption extent and continuance through DC ($\beta = 0.208$, 90% CI [0.123, 0.304]) indicates that the adoption-continuance relationship is also statistically connected with adaptive capability. Because both the direct and indirect associations were statistically significant, DC can be interpreted as an additional statistical pathway linking adoption extent with continuance. However, this finding should not be interpreted as evidence of a temporal or causal mediation mechanism. None of the

business-location dummy variables was significantly associated with EA, DC, or continuance. These control results indicate that location did not explain significant additional variance in the endogenous constructs in the estimated model, but they do not establish regional equivalence or structural invariance.

The regional context also defines an important boundary for interpreting these findings. The sampled SMEs were located in the Special Region of Yogyakarta, Central Java, and West Java, three Java-based regions characterized by relatively high SME concentrations and comparatively developed digital and e-commerce activity. Consequently, the findings may be most relevant to digitally active SMEs operating in similarly resource-constrained but increasingly digitalized business environments. They should not be assumed to represent SMEs in Indonesian regions with different levels of digital infrastructure, market development, or institutional support. Replication across more geographically and institutionally diverse settings is therefore needed before broader empirical generalization can be established.

5.2. Theoretical implications

This study provides theoretical implications for research on SME EA and continuance. First, it demonstrates the usefulness of applying the TOE framework to variation in the extent of EA among existing digital users rather than only to a binary adopter–non-adopter distinction. Although the TOE framework remains relevant for identifying organizational-level conditions associated with technology adoption and use (Awa et al., 2017; Tornatzky & Fleischer, 1990), the findings indicate that its three dimensions may not operate with equal strength in the SME context. The contribution therefore lies in applying TOE to a post-entry digital-use context rather than in extending the TOE framework itself. The non-significant role of TE suggests that technological attributes may be less differentiating when e-commerce platforms are familiar and accessible. Conversely, organizational readiness and environmental pressure appear more closely associated with adoption among the sampled SMEs.

Second, this study supports the relevance of DCT for explaining EC. DC emphasizes firms' capacity to sense opportunities, seize them, and transform resources in response to environmental change (Teece, 2007; Teece et al., 1997). The findings suggest that DC is positively associated with continued e-com-

merce use and that more extensive EA is also strongly associated with DC. Because the constructs were measured cross-sectionally, DCT is used here as an explanatory lens for theoretically specified associations rather than as evidence of an observed temporal capability-development process. This is relevant for resource-constrained SMEs, although it should be interpreted as an association rather than a causal claim.

Third, integrating TOE and DCT offers an integrative post-adoption perspective on SME digitalization. TOE explains conditions associated with the extent of adoption, whereas DCT helps explain the role of adaptive capability in relation to sustained use. The significant direct association between adoption extent and continuance, together with the significant indirect association through DC, provides a more differentiated account of post-adoption digitalization than treating adoption and continuance as equivalent outcomes. The temporal ordering of these relationships, however, remains to be established through longitudinal research.

5.3. Managerial implications

The findings offer practical implications for SME owners and managers, policy makers, business mentors, and digital platform providers. For SME owners and managers, EC is a post-adoption process that requires more than simply maintaining access to a digital platform. Owner or managerial support, sufficient time to manage e-commerce activities, and the digital skills required to operate platform accounts and features are directly reflected in the organizational conditions assessed in this study. Owner or managerial support, sufficient time for managing e-commerce activities, and relevant digital skills may support more consistent and extensive e-commerce engagement rather than occasional use.

Sustaining e-commerce use may also require SMEs to develop adaptive capabilities. SMEs should continuously monitor digital market trends, identify emerging online sales opportunities, and make timely decisions when digital opportunities arise. They may also need to respond to market changes through e-commerce, adjust business processes, and reallocate resources to support digital activities. Deeper integration of e-commerce into core business processes is also consistent with the post-adoption continuance reflected in the study.

For policy makers, SME development institutions, and business mentors, the findings suggest that digitalization support programs should not assume that technological characteristics alone differentiate the extent of e-commerce use among SMEs that are already digitally active. In the present sample, organizational and environmental contexts were more strongly associated with adoption extent than TE. Accordingly, technical assistance may be complemented by support aimed at organizational readiness, digital-management skills, and SMEs' capacity to respond to customer and competitive pressures. Because this study did not experimentally evaluate specific support interventions, these recommendations should be regarded as implications derived from the observed associations rather than evidence of program effectiveness.

6. Limitations, future research directions

Several limitations should guide interpretation. First, the cross-sectional design supports theoretically grounded associations, but longitudinal or panel studies are needed to examine the temporal ordering among EA, DC, and continuance. In particular, the statistically significant indirect association through DC should not be interpreted as evidence of causal mediation. The study also used purposive sampling and included only SMEs with prior or current digital-use experience. Consequently, the findings explain variation among digitally active SMEs and cannot be generalized to SMEs that have not adopted e-commerce. Future research could explicitly compare non-adopters, recent adopters, established users, and firms that have discontinued digital channels. Respondents were recruited partly through SME training and mentoring networks. This recruitment channel may have resulted in a sample with greater exposure to business-development support or digital information than SMEs outside such networks, creating a potential selection effect. Second, although the sample covers three major regions in Java, future research should include broader geographies, SME sectors, and digital maturity levels. Furthermore, the non-significant business-location controls should not be interpreted as evidence of regional invariance. Future studies with adequate subgroup sample sizes could formally assess measurement invariance and regional differences. Third, self-reported data could be complemented by objective platform usage, transaction, or digital performance indicators. Although the full-collinearity VIF and Harman single-factor diagnostics suggested that common method variance was unlikely to be a dominant concern, these

procedures cannot eliminate the possibility of common method effects. Future research could also obtain information from multiple organizational informants. Finally, because EA extent and continuance are conceptually related post-adoption constructs, future studies should continue to assess their discriminant and longitudinal validity and investigate additional contextual conditions such as digital maturity, platform type, sector, environmental turbulence, and organizational resources.

7. Conclusions

This study examined associations among technological, organizational, and environmental contexts; the extent of EA; DC; and EC among digitally active SMEs in Indonesia. The findings indicate that organizational and environmental contexts are positively associated with the extent of EA, whereas the TE is not significantly associated with adoption extent. These results suggest that, in the sampled SMEs, internal readiness and external market pressures are more salient than perceived technological attributes in explaining variation in adoption extent. Furthermore, EA is positively associated with both DC and EC. DC is also positively associated with EC, and the indirect association between EA and continuance through DC is statistically significant. These findings distinguish current adoption extent from sustained post-adoption continuance and show that the two outcomes are statistically connected both directly and through DC.

Overall, the study contributes to e-commerce research by integrating the TOE framework and DCT to connect adoption-related contextual conditions, adoption extent, adaptive capability, and post-adoption continuance within a single empirical model. The contribution lies in this theoretical integration and the distinction between adoption extent and continuance, not in extending either theoretical framework or establishing a causal process. Because the evidence is cross-sectional and based on purposively sampled digitally active SMEs in three Indonesian regions, the findings should be interpreted within these empirical boundaries and viewed as a basis for further longitudinal and comparative investigation.

Funding

This research was funded by the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia (Kemdiktisaintek) through the Regular Fundamental Research Grant Program for Fiscal Year 2026, under Master Contract No. 257/C3/DT.05.00/PL-BARU/2026 and Derivative Contract No. 352a/UN62.21/PG.00.01/2026.

Acknowledgements

The authors gratefully acknowledge the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia (Kemdiktisaintek) for funding this research through the Regular Fundamental Research Grant Program for Fiscal Year 2026, under Master Contract No. 257/C3/DT.05.00/PL-BARU/2026 and Derivative Contract No. 352a/UN62.21/PG.00.01/2026. The authors also express their appreciation to Universitas Pembangunan Nasional "Veteran" Yogyakarta and Pelita Bangsa University for their institutional support in facilitating the implementation and completion of this research.

Author contributions

Yoga Religia – 60% (research concept and design; research methodology; writing the article; critical revision of the article).
Sri Dwi Ari Ambarwati – 20% (research concept and design; collection and/or assembly of data; data analysis and interpretation).
Miftakul Huda – 20% (collection and/or assembly of data; data analysis and interpretation; critical revision of the article).

Conflict of interest

The authors declare that there is no conflict of interest.

Ethics statement

This study involved human participants. Participation was voluntary and anonymous, and informed consent was obtained before participation. Respondents were informed that participation was voluntary, that they could decline to participate, and that their responses would be used solely for academic research purposes. Individual responses were treated confidentially and reported only in

aggregate form. An institutional determination issued by the Research and Community Service Institute (LPPM), Universitas Pembangunan Nasional "Veteran" Yogyakarta, confirmed that formal ethical approval was not required for this non--interventional survey study (Letter of Determination on the Non-Requirement of Formal Ethical Approval, No. 154a/UN62.21/PG.00.01/2026).

Data availability statement

The data supporting the findings of this study are not publicly available due to ethical or confidentiality constraints, but are available from the corresponding author upon reasonable request.

Appendix

A. Measurement items and sources

Construct	Conceptual domain	Code	Final item wording	Source
Technological context (TE)	relative advantage	TE1	The use of e-commerce helps my business reach a wider market.	Awa et al. (2017) Religia et al. (2025)
		TE2	The use of e-commerce helps reduce my business's marketing costs.	
		TE3	E-commerce has the potential to increase sales compared with conventional selling methods.	
	compatibility	TE4	The e-commerce platform used by my business is compatible with the type of products/services we offer.	
		TE5	The use of e-commerce is compatible with my business processes and ways of working.	
	ease of use	TE6	The e-commerce platform is easy for me or my business team to learn.	
Organizational context (OR)	top management support	OR1	The business owner/manager supports the use of e-commerce in the business.	Ocloo et al. (2025) Religia et al. (2025)
	organizational readiness	OR2	My business has sufficient time to manage e-commerce activities.	
	IT skill availability	OR3	My business team or I have the basic skills required to operate digital technologies.	

Construct	Conceptual domain	Code	Final item wording	Source
		OR4	My business team or I have the skills required to manage e-commerce platform accounts and features.	
Environmental context (EN)	competitor pressure	EN1	My main competitors have used e-commerce in their business activities.	Ocloo et al. (2025) Rahayu & Day (2015)
		EN2	My business is encouraged to adopt e-commerce in order to remain competitive.	
	customer pressure	EN3	My customers demand the availability of online transactions.	
		EN4	My customers prefer purchasing through digital platforms.	
E-commerce adoption (EA)	adoption commitment	EA1	My business has made a formal decision to use e-commerce as a sales channel.	Arshad et al. (2025) Awa et al. (2017)
		EA2	My business is committed to using e-commerce in its business activities.	
	current use	EA3	My business is currently actively using an e-commerce platform.	
		EA4	My business uses e-commerce consistently in its sales activities.	
	usage extent	EA5	Some of my business's products/services are marketed or sold through e-commerce.	
	usage intensity	EA6	Sales transactions through e-commerce occur regularly in my business.	
Dynamic capability (DC)	sensing	DC1	My business is able to regularly monitor changes in digital market trends.	Al Jabri et al. (2024) Teece (2007)
		DC2	My business is able to identify emerging online sales opportunities.	
	seizing	DC3	My business is able to make decisions quickly when digital opportunities arise.	
		DC4	My business is able to use e-commerce to respond to market changes.	
	transforming	DC5	My business is able to adjust its business processes after using e-commerce.	
		DC6	My business is able to reallocate resources to support e-commerce.	

Construct	Conceptual domain	Code	Final item wording	Source
E-commerce continuance (EC)	continuance commitment	EC1	My business has decided to continue using e-commerce in the future.	Arinto et al. (2026) Sultana et al. (2025)
		EC2	My business has a long-term commitment to the use of e-commerce.	
	post-adoption benefits	EC3	The use of e-commerce provides tangible benefits to my business performance.	
	post-adoption satisfaction	EC4	I am satisfied with the outcomes obtained from using e-commerce.	
	integration	EC5	E-commerce has become integrated into my business's core processes.	
	reliance	EC6	My business increasingly relies on e-commerce as a sales channel.	

Note: The questionnaire was administered in Indonesian. The English item wording reported in this appendix is a faithful translation of the items used in the survey. All constructs were modeled as first-order reflective constructs. The conceptual-domain labels were used for instrument development and content coverage and were not modeled as separate latent dimensions.

Source: Authors' own elaboration.

B. Pilot-test item refinement

Item – conceptual domain	Original item wording	Basis for removal
TE7 – ease of use	Management of transactions and product content on the e-commerce platform is relatively easy to perform.	The item did not meet the pilot-test validity criterion (outer loading < 0.50).
OR5 – top management support	The business owner/manager is involved in decision-making related to the use of e-commerce.	The item did not meet the pilot-test validity criterion (outer loading < 0.50).
OR6 – organizational readiness	My business has sufficient operational funds to support e-commerce.	The item did not meet the pilot-test validity criterion (outer loading < 0.50).
EN5 – government support	My business has access to digital training or mentoring provided by the government or related institutions.	Access to and utilization of government digitalization programs varied substantially across SMEs, making the item less contextually suitable for consistently representing the EN.

Item – conceptual domain	Original item wording	Basis for removal
EN6 – government support	Government programs or policies support the digitalization of SMEs such as my business.	SMEs differed considerably in their exposure to and utilization of government digitalization programs. The government-support domain was therefore considered insufficiently consistent for the study context.

Note: The initial questionnaire was pre-tested with 35 SMEs to assess item clarity, item validity, and contextual relevance. Five items were removed before the main survey. We removed TE7, OR5, and OR6 because they did not meet the validity criterion applied during the pilot assessment, while we removed EN5 and EN6 based on contextual-relevance considerations.

Source: Authors' own elaboration.

C. Descriptive statistics of measurement items and constructs

Panel A. Construct-level descriptive statistics

Construct	Number of Items	Mean	SD
Technological context (TE)	6	3.90	0.666
Organizational context (OR)	4	3.71	0.644
Environmental context (EN)	4	3.67	0.707
E-commerce adoption (EA)	6	3.60	0.702
Dynamic capability (DC)	6	3.53	0.718
E-commerce continuance (EC)	6	3.61	0.709

Panel B. Item-level descriptive statistics

Construct	Item	Mean	SD
Technological context (TE)	TE1	4.03	0.841
	TE2	3.98	0.845
	TE3	3.97	0.772
	TE4	3.88	0.841
	TE5	3.79	0.798
	TE6	3.73	0.784
Organizational context (OR)	OR1	4.02	0.750
	OR2	3.61	0.809
	OR3	3.64	0.822
	OR4	3.56	0.806
Environmental context (EN)	EN1	3.76	0.874
	EN2	3.75	0.886
	EN3	3.69	0.784
	EN4	3.47	0.874

Construct	Item	Mean	SD
E-commerce adoption (EA)	EA1	3.69	0.860
	EA2	3.81	0.841
	EA3	3.58	0.878
	EA4	3.54	0.881
	EA5	3.58	0.855
	EA6	3.40	0.869
Dynamic capability (DC)	DC1	3.52	0.825
	DC2	3.56	0.815
	DC3	3.53	0.807
	DC4	3.68	0.830
	DC5	3.50	0.913
	DC6	3.42	0.910
E-commerce continuance (EC)	EC1	3.83	0.892
	EC2	3.74	0.850
	EC3	3.61	0.867
	EC4	3.59	0.820
	EC5	3.44	0.815
	EC6	3.48	0.858

Source: Authors' own elaboration.

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