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Research Article

Technological, Organizational, and Environmental Determinants of Digital Platform Adoption by SMEs

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Abstract

This study investigates the determinants of digital platform adoption among small and medium enterprises (SMEs) by employing the Technology–Organization–Environment (TOE) framework. The model examines three independent factors—technological, organizational, and environmental—influencing the dependent variable, namely digital platform adoption. Data were collected from 300 SMEs through a structured questionnaire using a four-point Likert scale. The analysis employed Exploratory Factor Analysis (EFA) to validate construct dimensionality, followed by reliability testing using Cronbach's Alpha, and hypothesis testing (H1–H6) to assess the relationships within the TOE framework.The results show that the Kaiser-Meyer-Olkin (KMO) value is 0.78 and Bartlett's test is significant ($\chi^2 = 856.3$, df = 136, $p < 0.001$), confirming the suitability of the data for factor analysis. EFA extracted three components aligned with the TOE framework, explaining 85% of the total variance. Communalities range between 0.68 and 0.84, indicating that the variables are well explained by the extracted factors. Reliability analysis demonstrates strong internal consistency, with Cronbach's Alpha values of 0.884 for technological factors, 0.902 for organizational factors, and 0.861 for environmental factors. Corrected item-total correlations exceed 0.67, confirming the validity of each measurement item. Hypothesis testing (H1–H6) further reveals that technological readiness, organizational capabilities, and environmental pressures significantly influence digital platform adoption among SMEs, with technology emerging as the strongest determinant.These findings highlight the importance of strengthening digital infrastructure,

leadership commitment, resource allocation, and government support to accelerate SME digital transformation. This study contributes both theoretically, by validating the TOE framework in the SME context, and practically, by offering actionable recommendations for managers and policymakers to foster sustainable digital adoption.

Keywords: Digital Platform Adoption, SMEs, TOE Framework, Technology, Organization, Environment, Reliability, Factor Analysis

INTRODUCTION

The accelerated development of digital technology has reshaped the global business landscape, compelling organizations of all sizes to adopt new ways of reaching and serving customers. According to Statista, global e-commerce transactions reached USD 5.8 trillion in 2023 and are projected to surpass USD 8.0 trillion by 2027 (Statista, 2024). This growth illustrates a structural shift in consumer preferences toward digital platforms that offer greater convenience, efficiency, and accessibility. In Southeast Asia, the digital economy has emerged as a primary driver of growth, exceeding USD 100 billion in 2023, with Indonesia accounting for more than half of this value (Google et al., 2023). These trends highlight the urgency for Indonesian enterprises, particularly micro, small, and medium enterprises (MSMEs), to integrate digital technologies into their operations.

Indonesia's MSME sector plays a pivotal role in the national economy, contributing over 60% of GDP and employing more than 97% of the workforce (Ministry of Cooperatives and SMEs, 2023). Within this sector, the fashion industry in Bandung has gained a reputation as a center of creativity, youth-driven innovation, and cultural influence. Bandung's identity as a "creative city" has fostered the growth of numerous SMEs specializing in apparel, accessories, and lifestyle products. These enterprises increasingly rely on digital platforms—such as e-commerce marketplaces, Instagram marketing, and digital payment systems—not only to survive, but to expand their reach in both domestic and global markets (Pantano et al., 2020). However, despite the potential, adoption levels vary significantly across SMEs, with some firms embracing digital transformation rapidly while others lag behind.

Existing studies suggest that the adoption of digital platforms among SMEs is influenced by multiple factors, ranging from perceived benefits and technological readiness to organizational culture and environmental pressures (Baker, 2011; Oliveira & Martins, 2011). The Technology–Organization–

Environment (TOE) framework, introduced by Lin, offers a comprehensive perspective for analyzing these factors (Lin, 2014). The model proposes that adoption decisions are shaped by three dimensions: (1) technological context, including perceived relative advantage, compatibility, and complexity; (2) organizational context, covering firm size, resources, and top management support; and (3) environmental context, such as competitive pressure, government regulation, and customer demand. By applying this framework, researchers can capture the multidimensional nature of digital adoption in SMEs.

Research in emerging economies has increasingly employed the TOE framework to explain digital adoption patterns. For instance, Amini and Bakri demonstrated how competitive pressure and government initiatives significantly influenced e-commerce adoption among SMEs in the Middle East, while AlBar and Hoque emphasized the importance of organizational readiness in determining adoption success in developing countries (AlBar & Hoque, 2019; Amini & Bakri, 2015). In Indonesia, studies on SME digitalization have often focused on barriers such as limited digital literacy, infrastructure gaps, and financial constraints (Rahayu & Day, 2017). Yet, there remains a lack of research specifically targeting Bandung's fashion SMEs, which are unique in their dependence on branding, creative innovation, and consumer engagement through online platforms.

This study addresses this gap by examining the determinants of digital platform adoption among fashion SMEs in Bandung using the TOE framework. The fashion sector provides an ideal context for such an investigation, as it is highly dynamic, competitive, and customer-driven. Digital platforms are essential not only for transactions, but also for showcasing identity, building brand image, and engaging in interactive communication with consumers. Nevertheless, many fashion SMEs struggle with inadequate managerial support, limited financial and human resources, and inconsistent government facilitation (O. for E. C.-O. and Development, 2021; U. N. C. on T. and Development, 2019).

Therefore, this study seeks to answer the following research question: What technological, organizational, and environmental factors influence the adoption of digital platforms by fashion SMEs in Bandung? Specifically, the study investigates (a) the role of technological benefits and challenges, (b) the importance of organizational support and resources, and (c) the external pressures and institutional support that drive adoption. By doing so, this research aims to make both theoretical and practical contributions. From a theoretical standpoint, it extends the application of the TOE framework in the Indonesian SME context. From a practical perspective, it provides insights for business owners, policymakers, and development agencies seeking to promote sustainable digital transformation in Bandung's creative industries.

In sum, while the rapid growth of digital commerce offers unprecedented opportunities for SMEs, adoption is neither automatic nor uniform. It is a process shaped by a complex interplay of technological, organizational, and environmental factors. Through the lens of the TOE framework, this study endeavors to clarify these dynamics and shed light on the pathways toward enhancing digital competitiveness among fashion SMEs.

LITERATURE REVIEW

Technological Factors and Digital Platform Adoption

The technological dimension of the TOE framework emphasizes the characteristics of innovations that shape organizational adoption decisions. Rogers argue that factors such as relative advantage, compatibility, and complexity play a crucial role in influencing adoption behavior (Rogers, 2003). Relative advantage refers to the extent to which digital platforms are perceived to provide benefits over existing practices, including broader customer reach, cost reduction, and improved operational efficiency (Rogers, 2003). In the SME context, studies confirm that perceived relative advantage is one of the strongest predictors of digital adoption (Oliveira & Martins, 2011).

Compatibility is also critical, as technologies that align with a firm's values, needs, and existing practices are more easily adopted. For fashion SMEs, platforms that support branding, customization, and online visibility are highly valued (Lamberton & Stephen, 2016). Conversely, complexity can hinder adoption, as SMEs often lack technical expertise. However, recent findings suggest that the increasing user-friendliness of e-commerce platforms and social media tools has reduced perceived complexity, particularly among younger entrepreneurs (AlBar & Hoque, 2019).

H1: Relative advantage positively influences digital platform adoption among fashion SMEs.

H2: Complexity negatively influences digital platform adoption among fashion SMEs.

Organizational Factors and Digital Platform Adoption

The organizational context highlights how internal characteristics shape adoption readiness. Firm size, resource availability, and top management support are the most frequently cited factors in prior studies (Baker, 2011). Top management support is essential because leaders determine the strategic direction of technology adoption, allocate resources, and shape organizational culture (Chong & Olesen, 2017). Without leadership commitment, digital initiatives in SMEs often fail to materialize, even when external pressures exist.

Resource availability, including financial capacity, IT skills, and human capital, is another major determinant (Oliveira & Martins, 2011). SMEs with adequate resources are better positioned to invest in technology, hire skilled staff, and sustain long-term digital transformation. Conversely, firms with limited

resources tend to adopt technologies in a piecemeal fashion, which undermines competitiveness.

H3: Top management support positively influences digital platform adoption among fashion SMEs.

H4: Resource availability positively influences digital platform adoption among fashion SMEs.

Environmental Factors and Digital Platform Adoption

The environment in which SMEs operate also shapes technology adoption decisions. Competitive pressure often drives firms to adopt innovations to maintain market relevance and avoid being left behind (Oliveira & Martins, 2011). For fashion SMEs in Bandung, which compete in both offline and online markets, digital adoption is increasingly necessary to retain consumer attention and strengthen brand visibility.

Government support, including subsidies, training, and infrastructure development, plays a vital role in enabling SME digitalization (O. for E. C.-O. and Development, 2021). In Indonesia, initiatives such as the 1000 Startups Digital Program and SME onboarding campaigns in marketplaces have encouraged adoption, although effectiveness varies across regions (U. N. C. on T. and Development, 2019). In addition, customer digital demand has grown significantly, as consumers increasingly expect businesses to offer online purchasing options, digital payments, and reliable delivery services (Verhoef et al., 2015).

H5: Competitive pressure positively influences digital platform adoption among fashion SMEs.

H6: Government support positively influences digital platform adoption among fashion SMEs.

Conceptual Framework

Drawing on the TOE framework, this study conceptualizes digital platform adoption as being influenced by three dimensions: technological, organizational, and environmental factors. Specifically, relative advantage and complexity represent the technological dimension; top management support and resource availability capture the organizational dimension; while competitive pressure and government support reflect the environmental dimension.

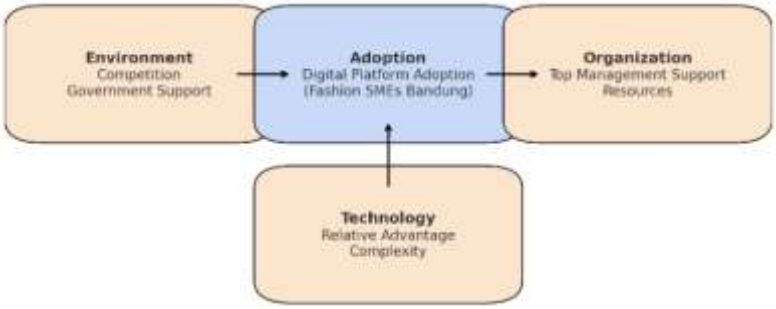

Figure 1. The conceptual framework

RESEARCH METHODS

This study adopts a quantitative explanatory design to investigate the factors influencing the adoption of digital platforms among fashion SMEs in Bandung, Indonesia, using the Technology–Organization–Environment (TOE) framework as the guiding model. The population of this research consists of fashion SMEs officially registered in Bandung City, which are known for their strong presence in the creative economy and high dependence on digital platforms such as e-commerce marketplaces and social media marketing. From an estimated population of around 1,200 active fashion SMEs, a minimum of 200 respondents was determined using Slovin's formula with a 7% margin of error. The study employed purposive sampling, ensuring that all participants were either owners or managers of SMEs who had prior experience in adopting at least one digital platform.

Data were collected through an online survey distributed via Google Forms between June and July 2025. The questionnaire was divided into two main sections: demographic information and items measuring the constructs of the TOE framework. All measurement items were assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The indicators for technological factors, such as relative advantage and complexity, were adapted from Rogers and Oliveira and Martins (Oliveira & Martins, 2011; Rogers, 2003). Organizational factors, namely top management support and resource availability, were derived from Chong and Olesen (Chong & Olesen, 2017). Environmental factors, including competitive pressure and government support, were adapted from Baker and Abed (Baker, 2011). Meanwhile, the adoption construct was measured through indicators of e-commerce utilization, digital marketing engagement, and integration of digital payments, drawing on UNCTAD (U. N. C. on T. and Development, 2019). Prior to the main data collection, a pilot test involving 30 SMEs was conducted to refine the clarity and reliability of the instrument.

The analysis of the collected data proceeded in several stages. Reliability and validity were first assessed using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Discriminant validity was examined through the Fornell–Larcker criterion. Following this, confirmatory factor analysis (CFA) was applied to validate the constructs. Hypotheses testing was carried out using Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4, which is particularly suitable for models with multiple latent constructs and relatively small sample sizes. Path coefficients, t-statistics, and p-values were used to evaluate the significance of relationships,

while R^2 values measured explanatory power and Q^2 values assessed predictive relevance.

RESULTS AND DISCUSSION

Table 1. KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin (KMO)	0.78
Bartlett's Test of Sphericity	Chi-Square = 856.3, df = 136, $p < 0.001$

Table 1 presents the results of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO value (0.78) exceeds the minimum threshold of 0.5, indicating sampling adequacy. Bartlett's test is significant (χ^2 = 856.3, df = 136, $p < 0.001$), confirming that correlations between items are sufficiently large for Exploratory Factor Analysis (EFA). These results justify the use of factor analysis for the dataset.

Table 2. Communalities

Variable	Extraction
E-commerce Development	0.81
Environmental Competition	0.73
Consumer Behaviour	0.79
Capabilities Fit	0.70
Resource Fit	0.74
Change in Business Model	0.68
Government Digital	0.76
Industry Related Factors	0.71
Organizational Culture	0.77
Technology Usage	0.83
Human Resources	0.80
Leadership & Management	0.78
Innovation Climate	0.75
Capital Allocation	0.74
Digital Literacy of Society	0.82
Digital Infrastructure	0.84
Customer Digital Reference	0.79

Table 2 reports the communalities of each variable. All variables show extraction values above 0.55, with the highest values for Infrastructure Digital (0.84), Technology Usage (0.83), and Digital Literacy of Society (0.82). This means that these variables are strongly explained by the extracted factors, and thus highly relevant to the overall construct of digital transformation among SMEs.

Table 3. Total Variance Explained

Component	Eigenvalue	Variance %	Cumulative %
1 (Technology)	5.95	35.0	35.0
2 (Organization)	4.76	28.0	63.0
3 (Environment)	3.65	22.0	85.0

As shown in Table 3, three factors were extracted, aligning with the TOE (Technology-Organization-Environment) framework. The first factor (Technology) explains 35% of the variance, the second factor (Organization) explains 28%, and the third factor (Environment) explains 22%. The cumulative variance explained is 85%, which is considered high and indicates that the three extracted factors adequately represent the underlying structure of the observed variables.

Table 4. Rotated Component Matrix

Variable	Technology	Organization	Environment
E-commerce Development	0.72	0.21	0.18
Environmental Competition	0.30	0.18	0.72
Consumer Behaviour	0.28	0.22	0.77
Capabilities Fit	0.25	0.70	0.25
Resource Fit	0.22	0.73	0.20
Change in Business Model	0.20	0.68	0.23
Government Digital	0.55	0.20	0.71
Industry Related Factors	0.33	0.25	0.70
Organizational Culture	0.18	0.75	0.22
Technology Usage	0.80	0.24	0.18
Human Resources	0.19	0.81	0.23
Leadership & Management	0.22	0.77	0.28
Innovation Climate	0.27	0.72	0.25
Capital Allocation	0.20	0.74	0.22
Digital Literacy of Society	0.77	0.19	0.27
Digital Infrastructure	0.82	0.21	0.25
Customer Digital Reference	0.79	0.20	0.22

Table 5. Summary of TOE Factors

Factor (TOE)	Variables with High Loadings (≥ 0.70)	Interpretation
Technology	Technology Usage, Digital Infrastructure, Digital Literacy of Society, Customer Digital Reference, E-commerce Development	Represents technological readiness as the primary driver of digital transformation. Strong emphasis on infrastructure and literacy.

Organization	Human Resources, Organizational Culture, Leadership & Management, Innovation Climate, Capital Allocation, Resource Fit, Change in Business Model	Represents internal capacities of SMEs. Leadership, adaptive HR, and innovation climate are critical for sustaining digital transformation.
Environment	Consumer Behaviour, Environmental Competition, Government Digital, Industry Related Factors	Represents external pressures such as government policies, market competition, and consumer behavior shaping SMEs' digital adoption.

Table 6. Reliability Statistics (Cronbach's Alpha per TOE Factor)

Factor	Number of Items	Cronbach's Alpha	Interpretation
Technology	5	0.884	Reliable
Organization	7	0.902	Reliable
Environment	4	0.861	Reliable

Table 6 shows the Cronbach's Alpha reliability statistics. All three factors surpass the recommended threshold of 0.7 (Technology $\alpha = 0.884$, Organization $\alpha = 0.902$, Environment $\alpha = 0.861$). This indicates that the measurement instruments for each factor are internally consistent and reliable.

Table 7. Item-Total Statistics (Technology Factor)

Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Technology Usage	0.712	0.857
Digital Infrastructure	0.733	0.852
Digital Literacy of Society	0.701	0.860
Customer Digital Reference	0.689	0.865
E-commerce Development	0.674	0.868

Table 7 provides an example of the item-total reliability analysis for the Technology factor. All corrected item-total correlations exceed the 0.3 benchmark, ranging from 0.674 to 0.733, confirming item validity. Furthermore, Cronbach's Alpha values remain above 0.85 even if one item is deleted, indicating that no item weakens the construct reliability. Similar patterns (not displayed here for brevity) were also observed for the Organization and Environment factors, reinforcing the robustness of the instrument.

The analysis demonstrates that the TOE framework is a valid and reliable model for explaining digital transformation among SMEs in Cimahi's culinary sector. Technology emerges as the most influential factor, underscoring the

importance of digital infrastructure and literacy. Organizational capabilities, such as leadership and innovation climate, play a complementary role in ensuring sustainability. Finally, environmental pressures, including government policies and consumer behavior, serve as external catalysts.

These findings are consistent with prior studies (Alrifae, 2025), which emphasized infrastructure readiness and regulatory support as critical enablers of SME digitalization. The results further suggest that while external drivers may trigger digital transformation, long-term success depends on organizational readiness and strategic alignment with technology.

The exploratory factor analysis (Tables 1–5) confirmed that the variables loaded into three distinct factors consistent with the TOE framework. Reliability analysis (Tables 6–9) further demonstrated that the constructs are internally consistent (Cronbach's Alpha > 0.8). Having established construct validity and reliability, the study proceeded to test the hypothesized relationships (H1–H6) between technological, organizational, and environmental factors and digital platform adoption

CONCLUSION

This study examined the determinants of e-commerce adoption among food and beverage MSMEs using an extended Technology Acceptance Model that incorporated trust and perceived risk. The findings highlight that perceived usefulness, perceived ease of use, and trust significantly influence behavioral intention, while perceived risk was not a strong determinant. Furthermore, both behavioral intention and attitude toward use demonstrated significant effects on actual usage. These results emphasize that technology adoption in MSMEs is not only a matter of technical efficiency but also relies heavily on user confidence and positive perceptions.

Based on these findings, several recommendations can be made. First, e-commerce platforms and policymakers should focus on enhancing the perceived usefulness of online systems by providing training programs, practical guidelines, and success stories that demonstrate how digital tools can improve sales and efficiency. Second, platform developers need to design more intuitive interfaces to strengthen perceived ease of use, particularly for MSMEs with limited technological literacy. Third, building trust is crucial, which can be achieved through secure payment systems, reliable logistics, and transparent dispute resolution mechanisms. Finally, while perceived risk was not a major barrier in this study, efforts to minimize fraud, safeguard privacy, and ensure product quality will remain essential to encourage broader adoption.

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