Deepseek Adoption as a Companion to Support SMEs' Digital Marketing Strategy in Surabaya

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Abstract

Purpose: *This study aims to analyze the factors influencing the behavioral intention to adopt Deepseek as a digital marketing companion among Small and Medium Enterprise (SME) actors in Surabaya. The hypotheses tested include the influence of Perceived Ease of Use (PEU) and Perceived Usefulness (PU) on Behavioral Intention (BI) to adopt.* ***Methods:*** *This quantitative research employs a PLS-SEM model approach. Data was collected through an online questionnaire from 150 respondents comprising owners, marketing managers, or related staff across various SME sectors in Surabaya. The research instrument refers to validated variables of PEU, PU, and BI. Data analysis includes reliability and validity tests, as well as hypothesis testing using path analysis.* ***Results:*** *The findings indicate that both Perceived Ease of Use and Perceived Usefulness significantly and positively affect the intention to adopt Deepseek. Perceived Ease of Use also shows a strong direct effect on Perceived Usefulness. The model explains 87.3% of the variance in Behavioral Intention.* ***Implications:*** *The results provide practical insights for AI developers like Deepseek to enhance features that emphasize usability and tangible benefits for specific business tasks. For SME stakeholders and policymakers, the study highlights key drivers for digital tool adoption, suggesting that training programs should focus on improving both the perceived ease and the practical utility of such technologies to accelerate digital transformation in the SME sector.*

INTRODUCTION

The rapid digitization of the global economy has fundamentally altered the competitive landscape for small and medium enterprises (SMEs), placing immense pressure on these businesses to adopt digital marketing strategies to remain viable. In emerging economies like Indonesia, SMEs constitute over 99% of all businesses and contribute significantly to employment and GDP. However, they face persistent barriers to digital adoption, including limited financial resources, lack of technical expertise, and inadequate infrastructure (Sinha et al., 2024). In urban commercial hubs such as Surabaya, Indonesia's second-largest city, this challenge is particularly acute. SMEs must compete not only with local rivals but also with larger corporations and digital-native entrants leveraging sophisticated, data-driven marketing approaches. The core practical problem, therefore, lies in bridging the digital marketing capability gap for SMEs in a way that is accessible, affordable, and effective (Basir, 2024). Theoretically, while models like the Technology Acceptance Model (TAM) provide a framework for understanding technology adoption, their application to next-generation, generative AI tools in the specific context of resource-constrained SMEs remains under-explored. This creates a dual problem: a pressing real-world need for scalable marketing solutions among SMEs, and a theoretical gap in understanding the drivers of AI tool adoption in this unique setting (Ayinaddis, 2025).

Existing literature on technology adoption in SMEs has extensively applied foundational theories such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Diffusion of Innovation (DOI). Recent studies have validated these models in contexts like e-commerce platform adoption (Kanapathipillai et al., 2024), social media marketing (Apriandi et al., 2023), and cloud computing (Kulkarni et al., 2025). For instance, research by Tuyen & Hanh (2025) synthesized TAM, TPB, and TOE frameworks to explain e-commerce adoption, highlighting the enduring relevance of perceived usefulness and ease of use. Simultaneously, a growing body of work examines AI adoption in business. Studies have explored AI in customer service (Andrade & Tumelero, 2022), supply chain management (Cannas et al., 2024), and data analytics (Pillai, 2023). Specific to marketing, literature has begun investigating AI-powered tools for content personalization (Moqaddem, 2025), chatbots (Novitasari & Putri, 2025), and predictive analytics (Alshaketheep et al., 2024). However, this research often focuses on large corporations or generic AI applications, with findings suggesting that perceived benefits, complexity, and compatibility are key determinants.

Despite the proliferation of studies, a distinct and significant gap exists at the intersection of three areas: SME digital adoption, generative AI applications, and hyper-local urban contexts. First, while TAM is well-tested, its constructs (PEU, PU) need re-examination for generative AI tools like Deepseek, which require prompt-based interaction and produce non-deterministic outputs, factors that may fundamentally alter user perceptions of "ease" and "usefulness" (Al-Obaydi & Pikhart, 2025). Second, the majority of AI adoption studies concentrate on large enterprises or generic business functions, overlooking the specific pain points, resource profiles, and decision-making processes of SMEs (Shokran et al., 2025). Third, there is a geographical concentration of research in Western contexts, with limited empirical work focusing on Southeast Asian SME ecosystems, particularly in secondary cities like Surabaya which have unique market dynamics (Perkasa & Widianto, 2025). Consequently, it remains unclear whether and how the established relationships in TAM hold when applied to a cutting-edge, conversational AI tool being evaluated by Surabaya's diverse SME owners and marketers for specific, tactical marketing support. This study posits that the unique characteristics of generative AI and the SME context may modulate the strength and nature of these traditional pathways.

Based on the identified gap, this study is guided by the following research question: What are the key determinants, based on the TAM framework, that influence the behavioral intention of SME actors in Surabaya to adopt Deepseek as a digital marketing companion? To address this, the study has three specific objectives: (1) To analyze the direct effect of Perceived Ease of Use (PEU) on Behavioral Intention (BI) to adopt Deepseek; (2) To examine the direct effect of Perceived Usefulness (PU) on BI; and (3) To investigate the indirect effect of PEU on BI, mediated by PU. The novelty of this research is threefold. First, it applies the classic TAM to a novel technological artifact, as a generative AI marketing companion, testing the model's robustness in the face of evolving technology (Hassan et al., 2024). Second, it focuses on a critically important yet under-researched demographic: SMEs in a major Southeast Asian urban center, thereby contributing to context-specific knowledge (Baier et al., 2025). Third, it moves beyond intention studies for common platforms (e.g., social media) to explore adoption drivers for a specialized, AI-powered tool that supports core business functions, offering fresh insights for both theory and practice in the age of democratized AI (Lemos et al., 2022).

METHODS

Research Design

This study employed a quantitative, explanatory research design to investigate the causal relationships between the core constructs of the Technology Acceptance Model (TAM)—Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Behavioral Intention (BI)—within the specific context of adopting Deepseek as a marketing companion among SMEs in Surabaya. The study design is cross-sectional, capturing perceptions and intentions at a single point in time. The Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was selected as the primary analytical technique. PLS-SEM is particularly suitable for this research due to its ability to handle complex predictive models, its robustness with smaller sample sizes, and its strength in theory development and exploration, which aligns with the study's objective of testing an established model (TAM) in a novel context (Hair & Alamer, 2022). This methodological choice allows for a simultaneous assessment of the measurement model (validity and reliability of the constructs) and the structural model (strength and significance of the hypothesized paths), providing a comprehensive analysis of the proposed adoption drivers (Sarstedt et al., 2022).

Sample Population and Subject of the Research

The target population for this research comprised individuals actively involved in the strategic or operational marketing activities of Small and Medium Enterprises (SMEs) operating within the metropolitan area of Surabaya, Indonesia. The operational definition of an SME followed the criteria established by the Indonesian Ministry of Cooperatives and SMEs, which considers factors such as annual revenue and number of employees. The study focused on a purposive sample of decision-makers and key influencers, including business owners, marketing managers, digital marketing staff, business consultants serving SMEs, and entrepreneurs (Putri & Novitasari, 2025). This sampling frame ensured that respondents had the authority and practical need to evaluate and adopt new marketing technologies. A non-probability purposive sampling technique was utilized to recruit participants who met the core criterion: direct involvement in their SME's marketing functions (Jin et al., 2024). The final sample size was 150 respondents. This sample size is considered adequate for PLS-SEM analysis, as it comfortably exceeds the minimum requirement of ten times the largest number of formative indicators or structural paths pointing to a latent construct in the model (Hair & Alamer, 2022). The demographic and business characteristics of the respondents, detailed in the Results section, confirm the diversity of the sample across generations, education levels, occupational roles, and SME sectors, enhancing the representativeness of findings within the Surabaya SME ecosystem.

Data Collection Techniques and Instrument Development

Data collection was executed via a structured online questionnaire distributed over a three-week period. The survey link was disseminated through key channels, including local SME business associations (e.g., HIPMI Surabaya), digital marketing professional networks, and social media groups focused on Surabaya entrepreneurs. This method ensured efficient reach to the targeted, geographically specific population. The research instrument was developed in three stages. First, the measurement items for the three core latent variables (PEU, PU, and BI) were adapted from the seminal works of Davis (1989) and subsequent validations in IT adoption studies (Kuo et al., 2019). The wording was carefully contextualized to reflect the specific use case of "Deepseek as a marketing companion." For example, the original item "Using the system improves my performance" (Ibrahim et al., 2024) was adapted to "Using Deepseek makes my

daily marketing activities easier" (PU2). Second, the questionnaire included a section to capture demographic and business profile data, such as generation, education, job role, SME type, and prior experience with AI tools. Third, the initial draft was reviewed by two academic experts in information systems and one SME marketing practitioner to ensure face and content validity (Hair & Alamer, 2022). A pilot test was conducted with 20 SME representatives not included in the final sample, leading to minor refinements in phrasing for clarity. The final questionnaire consisted of four sections: (1) a brief introduction and consent statement, (2) demographic/business profile questions, (3) twelve core measurement items (four for each construct: PEU1-PEU4, PU1-PU4, BI1-BI4) measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), and (4) an open-ended question for optional general comments.

Data Analysis Techniques

Data analysis followed a systematic two-stage procedure for PLS-SEM using SmartPLS 4 software, adhering to the guidelines proposed by Hair & Alamer (2022).. The first stage involved assessing the measurement model (outer model) to evaluate the reliability and validity of the constructs. Internal consistency reliability was examined using both Cronbach's Alpha and Composite Reliability, with a threshold value of >0.70 considered acceptable. Convergent validity was assessed through the Average Variance Extracted (AVE), requiring a value >0.50, indicating that the construct explains more than half of the variance of its indicators. Discriminant validity, ensuring constructs are distinct from one another, was tested using the Fornell-Larcker criterion (where the square root of a construct's AVE should be greater than its correlations with other constructs) and the more stringent Heterotrait-Monotrait (HTMT) ratio of correlations, with a conservative threshold of <0.85. The second stage focused on evaluating the structural model (inner model). This involved examining the significance and relevance of the path coefficients (β) using a bootstrapping procedure with 5,000 subsamples to generate t-statistics and p-values. The coefficient of determination (R^2) for the endogenous constructs (PU and BI) was calculated to assess the model's explanatory power, with values of 0.75, 0.50, and 0.25 considered substantial, moderate, and weak, respectively. Furthermore, the effect size (f^2) was calculated to determine the substantive impact of each exogenous construct on the endogenous construct. Finally, the specific indirect effect of PEU on BI via PU was calculated and its significance tested using the same bootstrapping method to confirm the hypothesized mediation. This comprehensive analytical plan ensured a robust evaluation of both the quality of the measurement instrument and the validity of the proposed theoretical relationships.

RESULTS AND DISCUSSION

Demographic Profile of Respondents

The study successfully gathered responses from 150 SME actors in Surabaya. The sample was balanced in terms of generation (50% Gen X, 50% Gen Y) and gender (52% male, 48% female). Education levels varied, with the largest group holding a bachelor's degree (28%). Most respondents were SME owners (32%) or marketing managers (28%). The most represented business sectors were Food & Beverage (25.3%) and Health & Beauty (22.7%). Regarding AI experience, 28% reported having no experience, while 37.3% had intermediate to advanced knowledge.
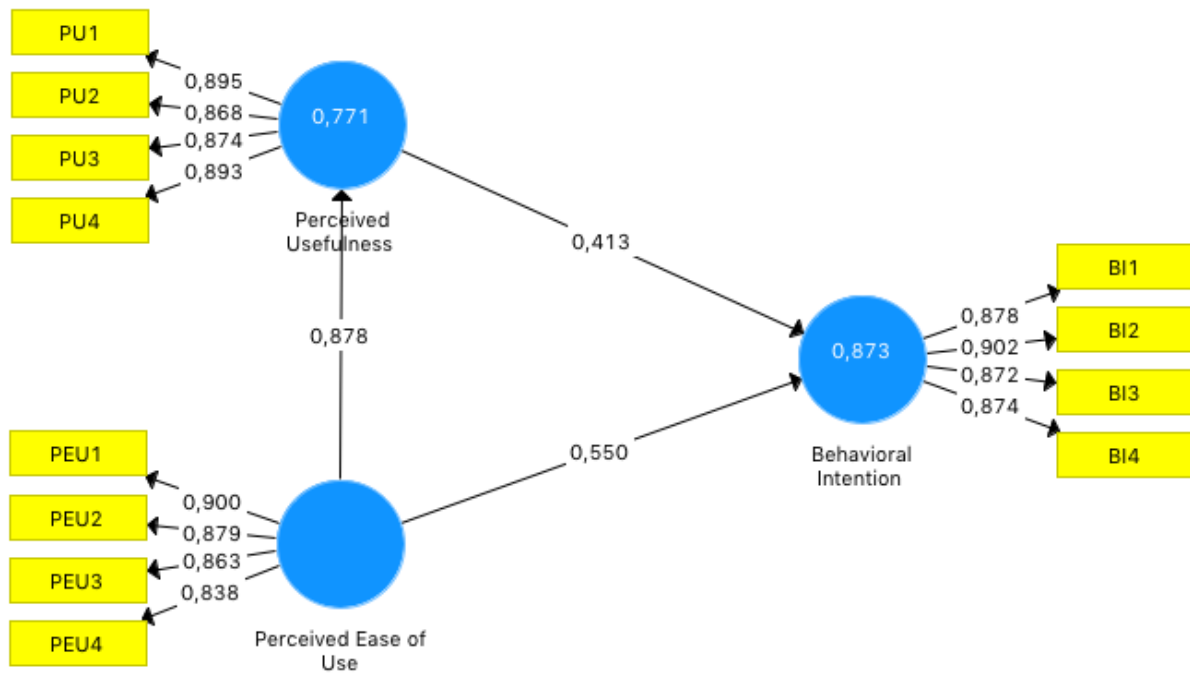
Figure 1. PLS Model

Measurement Model Assessment

The measurement model demonstrated strong reliability and convergent validity. All constructs exceeded the recommended thresholds: Cronbach's Alpha and Composite Reliability were above 0.89 for all three constructs, indicating excellent internal consistency. The Average Variance Extracted (AVE) values were all above 0.75, well above the 0.5 benchmark, confirming convergent validity. Discriminant validity was established as the square root of the AVE for each construct (diagonal values in the correlation matrix) was greater than its correlations with other constructs, and all HTMT values were below 0.85.

Structural Model and Hypothesis Testing

Table 1. Hypothesis Testing

Variable Relationship	B	T Statistics	P Values	Hypothesis
PEU -> PU	0.878	20.673	0.000	H_1 Accepted
PEU -> BI	0.550	18.533	0.000	H_2 Accepted
PU -> BI	0.413	16.302	0.000	H_3 Accepted
PEU -> PU -> BI	0.363	16.296	0.000	H_4 Accepted

The structural model exhibited strong predictive power. The R^2 values were 0.771 for Perceived Usefulness and 0.873 for Behavioral Intention, indicating that the model explains a substantial 87.3% of the variance in adoption intention. All hypothesized paths were statistically significant ($p < 0.001$). Perceived Ease of Use had a strong and significant positive effect on Perceived Usefulness ($\beta = 0.878$, $t = 20.673$), supporting the fundamental TAM relationship. Furthermore, both Perceived Ease of Use ($\beta = 0.550$, $t = 18.533$) and Perceived Usefulness ($\beta = 0.413$, $t = 16.302$) had significant direct effects on Behavioral Intention. The effect size (f^2) analysis indicates that PEU has a large effect on PU ($f^2 = 3.358$) and a medium-to-large effect on

BI ($f^2 = 0.547$), while PU has a medium effect on BI ($f^2 = 0.308$). On the other hand, the analysis of the specific indirect effect, reveals a significant mediation pathway. Perceived Ease of Use positively influences Behavioral Intention through Perceived Usefulness ($\beta = 0.363$, t = 16.296, p < 0.001). This confirms that part of PEU's impact on the intention to adopt is mediated by the user's assessment of the tool's utility.

DISCUSSION

The findings strongly support the application of the TAM framework in the context of adopting an AI marketing companion among SMEs. The very high R^2 value for Behavioral Intention (0.873) underscores the potency of the combined PEU and PU constructs in predicting adoption intent in this specific context. First, the powerful effect of Perceived Ease of Use on Perceived Usefulness ($\beta = 0.878$) aligns perfectly with Davis (1989) original proposition. For SME actors, who often juggle multiple roles and may lack dedicated IT support, if an AI tool like Deepseek is perceived as easy to interact with and master, they are far more likely to also perceive it as genuinely useful for their marketing tasks (Al-Obaydi & Pikhart, 2025). This finding is crucial for developers, as an intuitive user interface and a shallow learning curve are not just desirable features but foundational drivers of perceived value. Second, the significant direct effects of both PEU and PU on BI reinforce that SME decision-makers consider both factors independently (Ibrahim et al., 2024). While the tool must ultimately be seen as useful for planning activities, easing daily tasks, and generating strategies, the journey to that conclusion is heavily dependent on initial interactions being "clear and understandable" and skills being easy to acquire. The medium-to-large effect size of PEU on BI ($f^2 = 0.547$) suggests that for this novel technology, reducing complexity might be as critical as demonstrating utility in driving adoption.

The significant indirect effect highlights the dual role of ease of use. It is not only a direct driver of intention but also a critical antecedent that shapes the perception of usefulness (Tuyen & Hanh, 2025). This implies that marketing and training initiatives for Deepseek should not solely focus on listing beneficial features. Instead, they must first convincingly demonstrate and facilitate a smooth, hassle-free user experience to lay the groundwork for recognizing the tool's practical benefits (Ayinaddis, 2025). This study also extends previous TAM research by validating its core relationships in the novel domain of generative AI for specialized business purposes within Indonesian SMEs. It confirms that even for advanced AI, the fundamental tenets of user acceptance hold true. The results challenge any assumption that the perceived complexity of AI might diminish the role of ease of use; conversely, they emphasize its heightened importance.

CONCLUSION

This study concludes that the intention of Surabaya-based SMEs to adopt Deepseek as a marketing companion is strongly driven by their perceptions of its ease of use and usefulness. Perceived Ease of Use exerts a strong direct influence on adoption intention and is the primary determinant of Perceived Usefulness, which in turn also directly and significantly affects intention. The model demonstrates high explanatory power, confirming the relevance of the TAM framework in this new context. However, this research has limitations. The use of non-probability sampling and a geographic focus on Surabaya may limit the generalizability of findings to other regions or countries. The study also relied on self-reported intentions rather than observing actual adoption behavior. For future research, it is recommended to longitudinal studies to track how perceptions evolve and translate into actual usage over time. Investigating moderating factors, such as the level of AI experience or business sector type, could provide deeper insights. Expanding the model to

include other variables like facilitating conditions or social influence from the UTAUT model could also be valuable. For practitioners and AI developers, the key recommendation is to prioritize user experience design that maximizes intuitive interaction and minimizes the learning effort for non-technical SME users. Concurrently, clear communication and demonstrations of specific, tangible marketing benefits, such as content creation, campaign planning, and sales strategy formulation, are essential to solidify perceived usefulness and drive adoption.

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