Development of an AI-Based Conceptual Model for Predicting Consumer Purchase Decisions in the Digital Economy

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Abstract: The rapid growth of the digital economy has transformed consumer behavior, driven largely by the integration of artificial intelligence (AI) into digital marketing practices. Consumers are increasingly influenced by personalized advertisements, chatbot interactions, AI-driven product recommendations, and user interface experiences. However, existing models of consumer behavior remain limited in capturing the complexity of these AI-enhanced stimuli. This paper proposes the development of a conceptual framework that links digital stimuli to consumer purchase decisions, with AI-based marketing strategies serving as moderating variables. The model synthesizes insights from behavioral science, marketing theory, and intelligent systems, aiming to establish a theoretical basis for empirical validation. The framework provides both academic contributions—by extending consumer behavior models to include AI-driven mechanisms—and practical insights for optimizing AI-powered marketing strategies in the digital economy.

INTRODUCTION

The rapid development of the digital economy has significantly reshaped consumer behavior, particularly in the e-commerce sector. Digital stimuli such as personalized advertising, social media engagement, recommendation systems, and interactive interfaces have become central in shaping perceptions, building trust, and driving consumer purchase intention. These elements reduce search costs, increase relevance, and enhance customer experiences, which directly affect purchasing decisions (Siow et al., 2025). Moreover, digital transformation in e-commerce has accelerated consumer adoption and shaped long-term behavioral changes, particularly among millennials and Gen Z (Wulandari & MS, 2023).

Artificial Intelligence (AI) has emerged as a strategic enabler that strengthens the effectiveness of digital marketing. AI-powered applications such as machine learning-

based personalization, dynamic pricing, chatbots, and predictive analytics provide tailored interactions while simultaneously moderating the impact of digital stimuli on consumer decisions. These capabilities enhance consumer trust and satisfaction while adding value for businesses in increasingly competitive marketplaces (Tjahyono et al., 2025). Empirical evidence confirms that AI-based tools—particularly those embedded in digital marketing ecosystems—amplify engagement and increase purchase intention in both local and global markets (Arif Rahman & Solihin Hasugian, n.d.)

In Indonesia, the adoption of AI in digital platforms has become highly relevant due to the rapid expansion of e-commerce and the tech-savvy behavior of millennials and Gen Z. Major platforms such as Tokopedia, Shopee, and Lazada have widely integrated AI features like product recommendations, chatbots, and data-driven personalization to strengthen consumer experience. Studies highlight that consumer trust and purchase behavior in Indonesia are strongly influenced by AI-driven personalization and gamification, which mediate the relationship between digital marketing stimuli and purchase intention (Santy & Iffan, 2023). These findings reinforce the significance of contextual analysis of AI-driven consumer behavior in emerging digital economies (Salwanisa & Wikartika, 2023).

Building on these dynamics, this study proposes a conceptual framework that integrates digital stimuli and AI-based strategies to explain consumer purchase decision-making in the digital economy. The framework refines theoretical perspectives on consumer behavior while offering practical insights for marketers aiming to optimize AI-enhanced digital marketing. By situating this analysis in the Indonesian e-commerce ecosystem, the research not only contributes to global discussions on digital marketing and AI but also contextualizes how technological innovation influences consumer purchase decisions in emerging markets (Santosa et al., 2024).

RESEARCH METHOD

This study adopts a conceptual model development approach, focusing on synthesizing theoretical foundations rather than conducting immediate empirical testing. The methodological process is structured to identify relevant variables from existing literature, establish logical linkages among constructs, and design a framework that

integrates both behavioral and computational perspectives. The methodological steps are outlined to ensure that the model can be empirically validated in future studies.

The subject of this study is digital consumers engaged in e-commerce platforms, particularly those active in emerging digital economies such as Indonesia. This group is chosen because they are highly exposed to AI-driven digital stimuli, including personalized advertising, chatbot interactions, recommendation systems, and dynamic pricing. The focus is on consumers aged 18–40 years, representing digital-native and millennial generations who dominate online purchasing behavior.

In the future validation stage, data will be collected from a sample of 250–400 respondents using structured questionnaires distributed through major e-commerce platforms (e.g., Tokopedia, Shopee, Lazada). This sample size aligns with recommendations for Structural Equation Modeling (SEM) analysis, while machine learning simulations will employ the same dataset to validate predictive accuracy.

To clarify the elements incorporated into the conceptual framework, the key variables of this study are summarized in Table 1. Digital stimuli, including personalized advertising, chatbot interactions, recommendation systems, and user interface design, are positioned as independent variables. Meanwhile, AI strategies such as machine learning-based pricing, sentiment analysis, and automated customer engagement act as moderating variables. Consumer behavioral responses namely purchase intention and purchase decision are treated as dependent variables.

Tabel 1. Summary of Research Variables and Roles in the Model

Variable Category	Specific Variables / Indicators	Role in Model
Digital Stimuli	Personalized Advertising, Chatbot/Virtual Assistant, Recommendation Systems, UI/UX Design	Independent Variables (X)
AI Strategies	Machine Learning-Based Pricing, Sentiment Analysis, AI-Driven Customer Engagement	Moderating Variables (Z)
Consumer Response	Purchase Intention, Purchase Decision	Dependent Variables (Y)

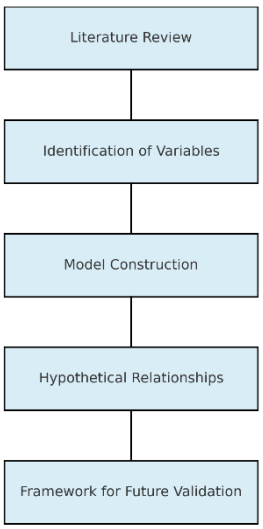
In order to outline the methodological stages of this research, Table 2 presents the planned data collection procedures and validation methods. The process begins with a systematic literature review, followed by the development of a conceptual framework. In future empirical studies, survey data will be collected from digital consumers aged 18–40, and the resulting dataset will be analyzed using SEM-PLS and validated through machine learning simulations. This multi-method approach ensures both theoretical rigor and predictive accuracy.

Tabel 2. Planned Data Collection and Validation Method

Stage	Method/Instrument	Expected Outcome
Literature Review	Systematic review of journals (2019–2024)	Identification of variables and theoretical foundation
Model Development	Synthesis of behavioral and AI literature	Conceptual framework construction
Future Data Collection	Online survey (250–400 respondents, age 18–40)	Empirical dataset for validation
Statistical Analysis	SEM-PLS	Testing causal relationships
Machine Learning Simulation	Random Forest, Gradient Boosting	Predictive validation of consumer purchase decisions

To illustrate the methodological structure, the following figures provide visual representation:

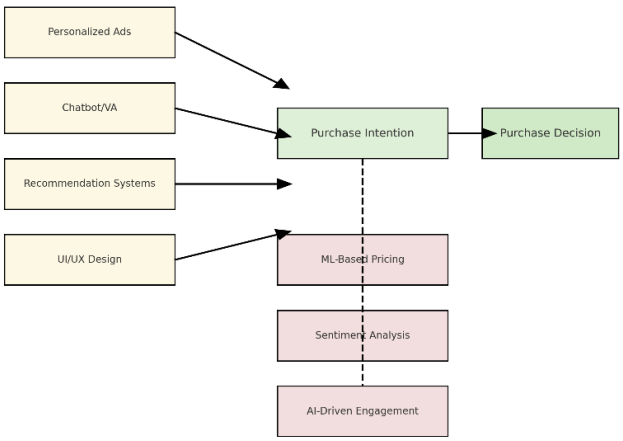
Figure 1. Flowchart of Research Design



Picture 1. Research Design

The conceptual framework is presented in Figure 2, which shows how AI-driven digital stimuli—such as personalized advertising, chatbot interactions, product recommendations, and UI/UX design—influence consumer purchase intention and decision-making. AI-based marketing strategies, including dynamic pricing, sentiment analysis, and automated customer engagement, are positioned as moderating variables that strengthen or weaken these relationships.

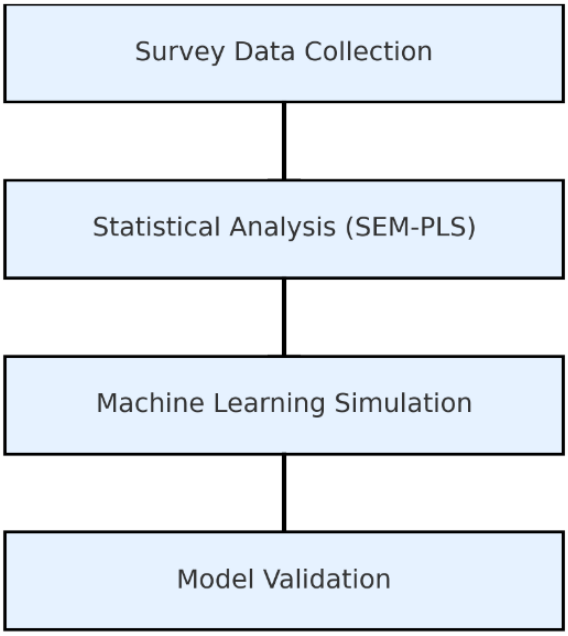
Figure 2. Conceptual Framework of the Study



Picture 2. Conceptual Framework of the Study

Finally, to ensure that the model is testable in future empirical research, a validation design is proposed, as illustrated in Figure 3. This framework suggests the use of quantitative methods (e.g., survey questionnaires analyzed with SEM-PLS) combined with machine learning simulations (e.g., Random Forest, Gradient Boosting) to predict consumer purchase decisions more accurately.

Figure 3. Proposed Framework for Future Validation



Picture 3. Proposed Framework for Future Validation

By combining these stages, the methodology provides a structured approach for developing and refining a conceptual model that integrates behavioral science with AI-driven marketing practices in the digital economy.

To ensure methodological rigor and empirical robustness, several statistical and computational calculations are planned for the validation stage of the proposed conceptual model. Within the SEM-PLS framework, internal consistency reliability will be tested using Cronbach's alpha and Composite Reliability (CR), while convergent validity will be assessed through the Average Variance Extracted (AVE). Discriminant validity will be examined using the Heterotrait–Monotrait (HTMT) ratio and cross-loadings, and multicollinearity will be evaluated through the Variance Inflation Factor (VIF). Model fit and predictive relevance will be further tested using the Standardized Root Mean Square Residual (SRMR), the coefficient of determination (R^2), Stone–Geisser's Q^2, and effect size (f^2). A sample of 250–400 respondents is recommended to achieve statistical power ($1-\beta \geq 0.80$).

In addition, machine learning methods such as Random Forest, Gradient Boosting, and Support Vector Machines will be applied to validate predictive accuracy. Classification metrics including Accuracy, Precision, Recall, F1-score, and ROC-AUC

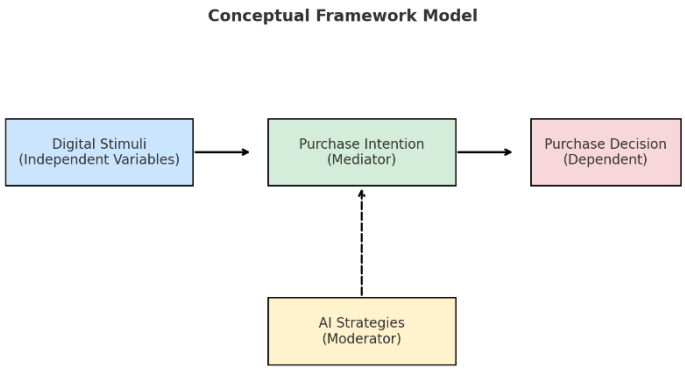
will be used to evaluate categorical outcomes (e.g., purchase decision), while regression metrics such as Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and R^2 will be applied to continuous variables (e.g., purchase intention). The summary of these calculations and interpretation thresholds is presented in Table 3.

Tabel 3. Summary of Planned Calculations and Criteria

Component	Calculation / Metric	Criteria / Threshold
Reliability	Cronbach's α; Composite Reliability (CR)	$\alpha \geq 0.70$; $CR \geq 0.70$
Convergent Validity	Average Variance Extracted (AVE)	$AVE \geq 0.50$
Discriminant Validity	HTMT; Cross-loadings	HTMT < 0.85 (strict) / < 0.90 (lenient)
Multicollinearity	Variance Inflation Factor (VIF)	VIF < 5 (ideal < 3.3)
Model Fit	SRMR	SRMR < 0.08
Predictive Relevance	Stone–Geisser's Q^2	$Q^2 > 0$
Effect Size	f^2	.02 small; .15 medium; .35 large
Statistical Power	A priori power analysis	$1-\beta \geq 0.80$; N = 250–400
ML (Classification)	Accuracy, Precision, Recall, F1, ROC-AUC	Higher values indicate better fit
ML (Regression)	MAE, RMSE, R^2	Lower MAE/RMSE; higher R^2
Component	Calculation / Metric	Criteria / Threshold
Reliability	Cronbach's α; Composite Reliability (CR)	$\alpha \geq 0.70$; $CR \geq 0.70$

RESULT AND DISCUSSION

The primary outcome of this research is the development of a conceptual framework that explains the interplay between digital stimuli, AI strategies, and consumer purchase behavior in the digital economy. The framework positions digital stimuli—such as personalized advertising, chatbots, recommendation systems, and interface design—as independent variables that directly influence consumer purchase intention, which subsequently leads to purchase decisions. Consumer purchase decision is therefore modeled as the final behavioral outcome, reflecting the effectiveness of digital marketing interventions



Picture 4. Proposed Framework for Future Validation

As illustrated in Figure 2, purchase intention acts as a mediating variable between digital stimuli and purchase decision, highlighting its crucial role in translating marketing efforts into actual consumer actions. Meanwhile, AI strategies—represented by machine learning-based pricing, sentiment analysis, and AI-driven customer engagement—are conceptualized as moderating variables. These strategies are expected to strengthen or weaken the relationship between digital stimuli and consumer responses depending on the degree of personalization, automation, and predictive accuracy provided by the AI systems.

From a theoretical perspective, this model contributes to consumer behavior research by integrating AI-based approaches into traditional frameworks of digital marketing. It emphasizes that consumer decision-making in the digital economy is no longer solely shaped by marketing stimuli, but also by the level of AI-driven personalization and engagement. Practically, the framework provides strategic insights

for e-commerce platforms and marketers, suggesting that investments in AI technologies can significantly improve consumer engagement, reduce decision-making uncertainty, and enhance conversion rates.

Contoh Tabel dan Gambar:

CONCLUSION

This study develops a conceptual model that integrates digital stimuli, AI-driven strategies, and consumer purchase behavior in the digital economy. The framework highlights how digital stimuli—such as personalized advertising, recommendation systems, chatbots, and user interface design—affect consumer purchase intention, which in turn drives purchase decisions. Furthermore, AI strategies are positioned as moderating variables that may enhance the effectiveness of these stimuli through personalization, automation, and predictive analytics.

From a theoretical standpoint, this research extends existing consumer behavior frameworks by embedding AI-based mechanisms into traditional digital marketing models. It emphasizes the dual role of AI as both a technological enabler and a behavioral moderator that influences the intensity of consumer responses. On the practical side, the study provides insights for e-commerce platforms and digital marketers on how the adoption of AI can improve engagement, reduce decision-making uncertainty, and increase purchase conversion.

In this regard, the present study is conceptually linked to and derived from the broader research entitled "Model Fundamental Stimulus Digital terhadap Keputusan Pembelian Konsumen: Implikasi pada Strategi Pemasaran Berbasis AI dan Ekonomi Digital." This work serves as a foundational step that refines the original model into an AI-based conceptual framework. However, the current study remains at a conceptual stage; thus, future research is required to empirically validate the proposed relationships using survey data, SEM-PLS, and machine learning simulations. Such validation will strengthen the robustness and applicability of the framework for both academic and industry contexts.

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