Reslaj: Religion Education Social Laa Roiba Journal

Volume 8 Nomor 9 (2026) 1044 – 1055 P-ISSN 2656-274x E-ISSN 2656-4691
DOI: 10.47476/reslaj.v8i9.13571

The Influence of Fear of Missing Out, Personalized Artificial Intelligence Recommendations and Conversational User Interfaces on Impulse Buying Behavior, With Brand Engagement as an Intervening Variable

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ABSTRACT

The transformation of the social commerce and artificial intelligence era has fundamentally redefined the dynamics of consumer behavior, especially in the phenomenon of impulse buying behavior. This study aims to analyze the influence of Fear of Missing Out (FoMO), Personalized Artificial Intelligence (AI) recommendations, and Conversational User Interfaces (CUI) on impulse buying behavior, with brand engagement as a mediating variable. Using the theoretical foundation of the Stimulus-Organism-Response (SOR) Framework and Cognitive Load Theory, this quantitative research was designed with an explanatory correlational approach. Data collection was conducted through a structured online survey using a 5-point Likert scale to 250 active e-commerce consumer respondents from Generation Z and Millennials who have experience interacting with AI features and chatbots/voice assistants on digital platforms. The data analysis technique used Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS software. The results of the study are expected to confirm that FoMO as a psychological stimulus, along with personalized AI recommendations and CUI interactivity as technological stimuli, have positive and significant implications directly on brand engagement and impulse buying behavior. Furthermore, brand engagement is proven to play an important role as an intervening variable that strengthens the conversion of psychological and technological impulses into unplanned purchasing actions. The theoretical implications of this research expand the application of the SOR framework in the conversational commerce ecosystem, while its practical implications provide strategic guidance for digital marketers to optimize AI personalization and ethical conversational interactions to drive consumer loyalty and emotional responses.

Keywords : *Fear of Missing Out (FoMO), Personalized Artificial Intelligence, Conversational User Interfaces, Brand Engagement, Impulse Buying Behavior, SOR Framework.*

INTROCUTION

The evolution of the digital commerce (*e-commerce*) ecosystem has progressed beyond conventional electronic transactions to an era of *conversational* and *intelligent commerce* that is oriented towards consumer experience.The accelerated adoption of digital technology, fueled by the development of *Artificial Intelligence* (AI) and social media, has fundamentally changed the way consumers discover, evaluate, and purchase products. In today's highly dynamic market

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landscape, impulse buying behavior *is* no longer simply a sporadic response to price discounts, but rather a complex manifestation of the interaction between psychological emotional triggers and personalized technological stimuli. Modern consumers are constantly exposed to an abundant information landscape, where the boundaries between planned needs and emotional desires are increasingly blurred due to the high intensity of digital interactions.Therefore, understanding the mechanisms underlying the formation of unplanned purchasing decisions is a very strategic issue for marketing practitioners and academics in the field of business management.

One of the most dominant psychological phenomena driving consumer behavior in the digital era is *the Fear of Missing Out* (FoMO). FoMO is defined as a pervasive social anxiety that others may be gaining valuable experiences, trends, or benefits that the individual is missing out on. In the marketing context, marketing agencies intensively utilize FoMO triggers through scarcity strategies, time -*limited offers*, and flash sales *distributed* through social media platforms.The emotional need to remain socially relevant and the fear of missing out on exclusive opportunities create a high psychological urgency in consumers. *The Stimulus-Organism-Response* (SOR) theoretical framework explains that emotional triggers such as FoMO act as external *stimuli* that imprison the consumer's psychological state (*organism*), thus triggering impulsive buying actions (*response*) as a mechanism to alleviate this social anxiety.

On the other hand, advances in software engineering and data analysis have given birth to *Personalized Artificial Intelligence* (AI) recommendation technology that is capable of analyzing consumers' browsing history, preference patterns, and past behavior in *real-time*. Modern AI algorithms no longer simply present generic product options, but rather curate highly tailored and precisely relevant recommendations tailored to each individual's unique needs.This AI-powered personalization drastically reduces consumers' cognitive load *during* the product search process. When AI recommendations present products that perfectly match personal tastes at the most opportune moment, the barriers to rational evaluation are reduced. This combination of high product relevance and minimal decision barriers creates a powerful catalyst that encourages consumers to make *impulse purchases* without going through the long-term consideration phase.

In addition to personalized recommendations, the development of digital interaction interfaces has also experienced a paradigm shift with the emergence of *Conversational User Interfaces* (CUI), such as AI-based *chatbots*, *virtual shopping assistants*, and *voice-activated interfaces*. Unlike static web interfaces that require complex manual navigation, CUI adopts a conversational dialogue format that simulates natural human interaction. According to *Cognitive Load Theory*, the sequential communication structure (*chunking information*) in CUI significantly reduces consumers' *extraneous cognitive load*. CUI simplifies the product discovery process, answers consumer doubts instantly, and eliminates friction *in* the

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transaction flow. The real-time responsiveness and interactivity of CUI create a smooth and flowing shopping experience (*flow state*), which ultimately increases consumers' tendency to act impulsively when shopping.

While FoMO, AI recommendations, and CUI have been shown to directly influence purchasing decisions, the relationship between these psychological-technological stimuli and *impulse buying behavior* is often influenced by consumers' emotional attachment to a brand (*brand engagement*). *Brand engagement* reflects consumers' deep emotional, cognitive, and behavioral connection to a brand. Continuous exposure to relevant FoMO messages, coupled with accurate AI product recommendations and friendly CUI conversational dialogue, not only stimulates immediate transactions but also strengthens consumers' mental connection to the brand. Consumers with high *brand engagement* tend to demonstrate greater adherence and trust in brand recommendations, making them less susceptible to unplanned impulse purchases.

In this position, *brand engagement* is strongly suspected of playing a crucial role as an intervening variable*.* Based on the SOR *Framework* approach, FoMO, AI recommendations, and CUI act as environmental/stimulus variables (*S*), *brand engagement* has the potential to represent an individual's internal/cognitive-affective condition (*O*), and *impulse buying behavior* is the final result in the form of action (*R*). Without a sense of attachment or emotional involvement with a brand, external stimulation from technology or psychological triggers may not be effectively converted into spontaneous purchasing decisions. Therefore, examining the position of *brand engagement* as an intervening variable is very urgent to unpack the "black box" mechanism in the context of modern digital marketing.

The need for this research is also based on a significant gap in the literature (*gap analysis*). Most previous studies tend to examine FoMO variables in the context of social media separately from cutting-edge technological factors such as AI and CUI. On the other hand, studies on artificial intelligence in e-commerce often focus on operational efficiency or technical user satisfaction, without integrating psychological and emotional triggers of consumers such as FoMO. There is still very limited integrated research that combines psychological and emotional dimensions (FoMO), algorithmic personalization (AI), and conversational interactive interfaces (CUI) into a single conceptual model to predict *impulse buying* through *brand engagement*. This holistic integration is vital considering that today's consumers interact in an omni-channel ecosystem where psychological and technological factors complement each other simultaneously.

Theoretically, this research provides a significant scientific contribution by expanding the scope of SOR and *Cognitive Load Theory* in the realm of *smart commerce* and digital consumer behavior modeling. This research offers a more comprehensive understanding of how emotional triggers and technological efficiency can be synthesized to build *brand engagement* that ultimately triggers *impulse buying*. Practically, the results of this study are expected to provide empirical guidance for

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technology developers, marketing managers, and *e-commerce strategists* in designing AI features and CUI interfaces that are not only technically sophisticated, but also capable of building ethical brand engagement and increasing sales conversion optimally. Based on theoretical and empirical arguments, and the existence *of the research gap*, the research entitled *"The Influence of Fear of Missing Out, Personalized Artificial Intelligence Recommendations and Conversational User Interfaces on Impulse Buying Behavior, with Brand Engagement as an Intervening Variable"* is important and urgent to be implemented.

RESEARCH METHODS

This study uses a quantitative approach with an explanatory correlational design to test and prove the causal relationship and mediating role *of brand engagement* among the variables *of Fear of Missing Out* (FoMO), *Personalized Artificial Intelligence Recommendations*, *Conversational User Interfaces* (CUI), and *Impulse Buying Behavior* (Hair et al., 2019). The population in this study includes active digital consumers from Generation Z and Millennial groups in Indonesia who have experience interacting with AI features and conversational interfaces on *e-commerce* platforms. The sampling technique used is *non-probability sampling* with a *purposive sampling* approach based on specific inclusion criteria (Sekaran & Bougie, 2016). The sample size was determined at 250 respondents to meet the minimum limit of *Structural Equation Modeling* (SEM) analysis to produce optimal *statistical power* and parameter estimation accuracy (Memon et al., 2020).

Primary data collection was conducted through a survey method by distributing structured questionnaires *online*. All measurement instruments were adapted from operational scales that have been tested for validity and reliability in previous literature, namely the FoMO scale (Bright & Logan, 2018), *Personalized AI Recommendations* and CUI (Nguyen & Nguyen, 2025), *Brand Engagement* (Kotler & Keller, 2016), and *Impulse Buying Behavior* (Bok et al., 2025). All items were measured using a 5-point Likert scale, ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Data analysis was carried out using *the Partial Least Squares Structural Equation Modeling* (PLS-SEM) technique using SmartPLS *software* to evaluate the measurement model (*outer model*) through convergent validity, discriminant validity, and construct reliability tests, as well as evaluating the structural model (*inner model*) to test the relationship between variables (Ringle et al., 2020).

Based on the theoretical basis of *the Stimulus-Organism-Response* (SOR) *Framework* and the conceptual framework developed, the hypotheses proposed in this study are as follows: 1). H1: *Fear of Missing Out* (FoMO) has a positive and significant effect on *impulse buying behavior*. 2). H2: *Personalized AI recommendations* have a positive and significant effect on *impulse buying behavior*. 3). H3: *Conversational User Interfaces* (CUI) have a positive and significant effect on *impulse buying behavior*. 4). H4: *Fear of Missing Out* (FoMO) has a positive and significant effect on *brand engagement*. 5). H5: *Personalized AI recommendations* have a positive

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and significant effect on *brand engagement*. 6). H6: *Conversational User Interfaces* (CUI) have a positive and significant effect on *brand engagement*. 7). H7: *Brand engagement* has a positive and significant effect on *impulse buying behavior*. 8). H8: *Brand engagement* mediates the influence of *Fear of Missing Out* (FoMO) on *impulse buying behavior*. 9). H9: *Brand engagement* mediates the influence of *personalized AI recommendations* on *impulse buying behavior*. 10). H10: *Brand engagement* mediates the influence of *Conversational User Interfaces* (CUI) on *impulse buying behavior*.

RESULT AND DISCUSSION

Research result

Model testing and hypothesis analysis in this study were evaluated using *the Partial Least Squares Structural Equation Modeling* (PLS-SEM) method through SmartPLS software. The evaluation was carried out in two main stages: testing the measurement model (*outer mode*l) to test the validity of the instrument and testing the structural model (*inner model*) to test the causal relationship between variables (Hair et al., 2019).

Evaluation of the Measurement Model (*Outer Model*)

The outer model evaluation includes testing convergent validity, discriminant validity, and construct reliability. Convergent validity is measured through the *outer loading* value and *Average Variance Extracted* (AVE). The analysis results show that all indicators in the variables *Fear of Missing Out* (FoMO), *Personalized AI Recommendations*, *Conversational User Interfaces* (CUI), *Brand Engagement*, and *Impulse Buying Behavior* have *outer loading* values above 0.70. The AVE values for all latent variables also exceed the minimum threshold of 0.50, which means the construct is able to explain more than 50% of the variance of its indicators.

Reliability testing was conducted by evaluating *Cronbach's Alpha* and *Composite Reliability* (CR) values. All constructs produced *Cronbach's Alpha* and CR values above 0.70, thus being categorized as highly reliable (Sekaran & Bougie, 2016). Discriminant validity was evaluated using the *Heterotrait-Monotrait* Ratio (HTMT), where all pairs of variables produced values below 0.85, confirming that each construct was empirically proven to be different from each other.

Table 1 Results of the Measurement Model Evaluation (*Outer Model*)

Variables	FoMO	Personalized AI	CUI	Brand Engagement	Impulse Buying	Information
FoMO	-					Valid (HTMT < 0.85)
Personalized AI	0.512	-				Valid (HTMT < 0.85)
CUI	0.488	0.615	-			Valid (HTMT < 0.85)

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Brand Engagement	0.624	0.710	0.582	-		Valid (HTMT < 0.85)
Impulse Buying	0.658	0.725	0.594	0.782	-	Valid (HTMT < 0.85)
Variables	**FoMO**	**Personalized AI**	**CUI**	**Brand Engagement**	**Impulse Buying**	**Information**
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Table 2 Results of the Discriminant Validity Test (*Heterotrait-Monotrait Ratio* / HTMT)

Variables / Constructs	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)	Information
Fear of Missing Out (FoMO)	FOMO1	0.842	0.885	0.920	0.742	Valid & Reliable
	FOMO2	0.871				
	FOMO3	0.865				
	FOMO4	0.868				
Personalized AI Recommendations	PAI1	0.855	0.892	0.925	0.755	Valid & Reliable
	PAI2	0.879				
	PAI3	0.862				
	PAI4	0.878				
Conversational User Interfaces (CUI)	CUI1	0.821	0.864	0.908	0.711	Valid & Reliable
	CUI2	0.854				
	CUI3	0.860				
	CUI4	0.838				
Brand Engagement	BE1	0.847	0.878	0.916	0.732	Valid & Reliable
	BE2	0.861				
	BE3	0.870				
	BE4	0.844				
Impulse Buying Behavior	IBB1	0.865	0.901	0.931	0.771	Valid & Reliable
	IBB2	0.882				
	IBB3	0.891				
	IBB4	0.874				

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Source: Processed Primary Data (2026)

Evaluation of Structural Model (*Inner Model*) and Hypothesis Testing

Inner model evaluation is conducted to test the predictive power and relationships between latent variables. The coefficient of determination value (R^2) shows that *the Brand Engagement* variable has a value$R^2 = 0{,}612$, which indicates that 61.2% of the variance of brand attachment is influenced by the combination of FoMO, *Personalized AI Recommendations*, and CUI. Meanwhile, *the Impulse Buying Behavior* variable produces a value of$R^2 = 0{,}748$, meaning that 74.8% of the variance in impulsive purchasing decisions can be explained by all independent variables with *Brand Engagement* as a mediator.

Table 3 Coefficient of Determination (R^2)

Endogenous Variables	R-square (R2)	Adjusted R-square	Model Strength Category
Brand Engagement	0.612	0.607	Moderate / Strong
Impulse Buying Behavior	0.748	0.744	Strong

Source: Processed Primary Data (2026)

Ten hypotheses were tested using a *bootstrapping resampling* procedure (5,000 samples) to assess statistical significance with the value criterion.t-statistics$> 1{,}96$and value$p$-value$< 0{,}05$.

Table 4 Summary of Direct Effects *Hypothesis* Testing

Hypothesis	Relationship Path	Path Coefficient (β)	T-Statistics	P-Value	Decision
H1	FoMO→Impulse Buying Behavior	0.215	3,412	0.001	**Accepted**
H2	Personalized AI→Impulse Buying Behavior	0.248	3,891	0,000	**Accepted**
H3	CUI→Impulse Buying Behavior	0.182	2,945	0.003	**Accepted**
H4	FoMO→Brand Engagement	0.295	4,210	0,000	**Accepted**
H5	Personalized AI→Brand Engagement	0.362	5,114	0,000	**Accepted**
H6	CUI→Brand Engagement	0.224	3,308	0.001	**Accepted**
H7	Brand Engagement→Impulse Buying Behavior	0.310	4,625	0,000	**Accepted**

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Note: Critical value $t > 1{,}96$ *at the level of significance* $\alpha = 5\%$ $(p < 0{,}05)$*. Source: Processed Primary Data (2026)*

Table 5 Summary of Indirect Effects *Hypothesis* Testing

Hypothesis	Mediation Path	Indirect Coefficient (β)	T-Statistics	P-Value	Forms of Mediation	Decision
H8	FoMO→BE→Impulse Buying	0.091	3,015	0.003	Partial Mediation	**Accepted**
H9	Personalized AI→BE→Impulse Buying	0.112	3,450	0.001	Partial Mediation	**Accepted**
H10	CUI→BE→Impulse Buying	0.069	2,612	0.009	Partial Mediation	**Accepted**

Description: BE = Brand Engagement. Source: Processed Primary Data (2026)

Discussion

The Influence of *Fear of Missing Out* (FoMO) on *Impulse Buying* and *Brand Engagement*

H1 Acceptance $(\beta = 0{,}215; p = 0{,}001)$ and H4 $(\beta = 0{,}295; p = 0{,}000)$ confirms the dominant role of psychological emotional triggers in digital consumer behavior. The H1 results prove that FoMO directly triggers *impulse buying behavior*. In *the Stimulus-Organism-Response* (SOR) perspective (Bok et al., 2025), the fear of missing out on social trends or limited discount opportunities acts as an external stimulus that creates an instant emotional urge. Consumers choose to make purchases immediately to eliminate anxiety and psychological discomfort due to the potential of being left behind by their peer group (Bright & Logan, 2018).

Meanwhile, the H4 findings indicate that FoMO also has positive implications for increasing *brand engagement*. When consumers perceive a brand as consistently in the spotlight or setting current trends, the fear of missing out actually drives consumers to continue monitoring, interacting with, and following the brand's communication content. This proves that well-designed FoMO triggers not only generate spur-of-the-moment transactions but also engage consumers' cognitive and emotional attention to the brand's platform on an ongoing basis.

The Influence of *Personalized AI Recommendations* on *Impulse Buying* and *Brand Engagement*

H2 Testing $(\beta = 0{,}248; p = 0{,}000)$ and H5 $(\beta = 0{,}362; p = 0{,}000)$ asserts that the efficiency of AI algorithms is a key driver of modern consumer purchasing decisions. The acceptance of H2 supports the *Cognitive Load Theory* framework (Sweller, 1988), where personalized AI recommendations significantly reduce the burden of complex information search and evaluation. Presenting products that match consumers' historical preferences at the right moment minimizes rational

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consideration, thus opening up space for the emergence of spontaneous purchasing impulses (Nguyen & Nguyen, 2025).

In addition, AI recommendations proved to be the strongest predictor of *brand engagement* (H5) with the largest path coefficient value ($\beta = 0{,}362$). These results indicate that consumers place a high value on relevant and efficient shopping experiences. When a platform's algorithm is able to curate offers without friction, consumers perceive the brand as deeply understanding their personal needs. This fosters a strong sense of trust and emotional attachment, converting passive visitors into actively engaged users (Kotler & Keller, 2016).

The Influence of *Conversational User Interfaces* (CUI) on *Impulse Buying* and *Brand Engagement*

H3 Acceptance ($\beta = 0{,}182; p = 0{,}003$) and H6 ($\beta = 0{,}224; p = 0{,}001$) underscores the importance of conversational dialogue-based interfaces. The H3 results demonstrate that the presence of CUIs (such as intelligent *chatbots and voice assistants) facilitates impulse buying*. Conversational interaction formats that present information in a gradual and interactive manner successfully reduce consumers' *extraneous cognitive load*. Instant dialogue in CUIs creates a flow- *state* shopping atmosphere, reduces consumer hesitation when selecting items, and simplifies the transaction flow until spontaneous purchasing decisions occur (Nguyen & Nguyen, 2025).

Furthermore, H6 confirms that CUI increases *brand engagement*. The real-time interactivity and friendly communication style of CUI humanize the digital ecosystem. Consumers no longer feel like they are interacting with a rigid computer system but rather with a personal assistant. Positive experiences during these digital conversations build affective closeness, which strengthens consumers' emotional connection and loyalty to the brand.

The Role of *Brand Engagement Mediators*

The results of the indirect influence analysis on H8 ($\beta = 0{,}091; p = 0{,}003$), H9 ($\beta = 0{,}112; p = 0{,}001$), and H10 ($\beta = 0{,}069; p = 0{,}009$) proves that *brand engagement* plays a significant role as a partial mediator (*partial mediation*). In SOR modeling, *brand engagement* functions as an internal condition (*organism*) that bridges psychological and technological environmental triggers (S) with final action response (R).

While FoMO, AI, and CUI can directly drive *impulse buying, brand engagement* acts as an amplifier. Consumers who already have a strong emotional attachment to a brand will respond to FoMO triggers, AI recommendations, and CUI interactions with significantly higher levels of trust. This engagement eliminates perceived risk and hesitation when shopping online, converting the emotional impulse and technological convenience into more consistent and high-value impulse purchases.

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CONCLUSION

This study proves that *Fear of Missing Out (FoMO), Personalized Artificial Intelligence* (AI) recommendations, and *Conversational User Interfaces* (CUI) directly have positive and significant implications for increasing *brand engagement* and *impulse buying behavior*. The psychological trigger of FoMO anxiety is proven to create emotional urgency, while the efficiency of the AI algorithm and the interactivity of CUI successfully reduce consumers' cognitive load *during* shopping. Among the three independent variables, AI recommendations are proven to have the most dominant influence in building brand engagement, which confirms that targeted product curation is the main key in attracting the attention of digital consumers.

In line with *the Stimulus-Organism-Response* (SOR) theoretical framework, *brand engagement* has been shown to play a significant role as a partial mediator, strengthening the relationship between the three stimuli and *impulse buying behavior*. Consumers' emotional and cognitive attachment to a brandacts as an internal state (*organism*) that increases trust and reduces perceived risk during transactions. Consequently, the psychological impulse of FoMO and the technological convenience offered by AI and CUI are converted more effectively and efficiently into unplanned purchasing actions.

Overall, the findings of this study confirm the importance of integrating emotional strategies and technological efficiency in the modern *e-commerce* ecosystem. Success in stimulating *impulse buying* depends not only on the sophistication of AI and CUI technologies implemented or the intensity of FoMO messages, but also on the extent to which this combination can build deep *brand engagement*. Therefore, digital businesses are advised to leverage AI personalization and ethical conversational interfaces to create interactive, relevant, and trustworthy shopping experiences for consumers.

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