

“Maintaining customer flow across digital and physical channels: The role of hybrid-experience fluency in omnichannel retail”

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MAINTAINING CUSTOMER FLOW ACROSS DIGITAL AND PHYSICAL CHANNELS: THE ROLE OF HYBRID-EXPERIENCE FLUENCY IN OMNICHANNEL RETAIL

Abstract

Omnichannel research emphasizes channel integration but gives limited attention to how customers maintain experiential continuity across digital and physical touchpoints. This study examines hybrid-experience fluency as a customer-side mechanism linking omnichannel system conditions to customer outcomes. Data from 575 consumers in Indonesia who recently completed a shopping episode involving the same retailer's digital platform and physical store were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The sample covered grocery, fashion, electronics, and home goods. Channel transition smoothness ($\beta = 0.311$), cognitive load management ($\beta = 0.281$), and temporal synchronicity ($\beta = 0.370$) positively influenced hybrid-experience fluency, whereas technological friction negatively influenced it ($\beta = -0.227$; all $p < 0.001$). Hybrid-experience fluency positively influenced customer satisfaction ($\beta = 0.408$), behavioral intentions ($\beta = 0.670$), and brand loyalty ($\beta = 0.638$; all $p < 0.001$). Shopping involvement weakened the relationship between hybrid-experience fluency and customer satisfaction ($\beta = -0.145$, $p < 0.001$), but strengthened its relationships with behavioral intentions ($\beta = 0.052$, $p = 0.006$) and brand loyalty ($\beta = 0.061$, $p = 0.007$). These findings position hybrid-experience fluency as an experiential mechanism connecting omnichannel system conditions with customer responses and demonstrate that shopping involvement shapes these relationships differently. The study extends omnichannel research beyond structural integration by highlighting customers' capacity to sustain experiential continuity within hybrid shopping episodes. For retailers, the findings emphasize smoother channel transitions, reduced cognitive demands and technological friction, and synchronized interactions across digital and physical channels to improve customer satisfaction, behavioral intentions, and brand loyalty.

Keywords

hybrid-experience fluency, omnichannel retailing,
channel transition smoothness, cognitive load
management, technological friction, customer
satisfaction, behavioral intentions, brand loyalty

JEL Classification

M31, L81, D91

INTRODUCTION

The digital transformation of retail has shifted customer shopping behavior from isolated channel interactions toward interconnected digital-physical journeys. More than 73% of customers now use multiple channels and expect seamless transitions across online and offline touchpoints (McKinsey & Company, 2024). This phenomenon is particularly relevant in Indonesia, where internet penetration reached 80.66% in 2025, creating a retail environment in which consumers increasingly combine digital and physical touchpoints within their shopping journeys (Intimedia, 2025). However, many retailers still struggle to synchronize customer data, inventory systems, pricing information, and operational processes across channels, creating fragmented experiences and inconsistencies between digital and physical touchpoints (Salesforce Research, 2023; Aksan et al., 2025; Baso et al., 2024).



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These inconsistencies create a problem that extends beyond the availability of digital technologies or multiple retail channels. Customers moving between digital and physical touchpoints may be required to restart purchasing processes, seek additional assistance, reconcile inconsistent information, or reassess decisions made earlier in the journey. Such disruptions can increase cognitive demands and interrupt the continuity of the shopping experience. Although omnichannel research has established the importance of channel integration and coordination (Lemon & Verhoef, 2016), the presence of integrated channels does not necessarily explain how customers psychologically experience and maintain continuity while moving between them. This distinction is particularly relevant in Indonesia, where the coexistence of rapidly expanding digital commerce and established physical retail creates frequent opportunities for customers to move between heterogeneous channel environments within the same shopping journey.

The resulting scientific problem concerns the limited understanding of the customer-side experiential mechanism through which digital–physical transitions are translated into customer outcomes. Existing research has extensively examined structural integration, information consistency, service quality, and operational alignment, while comparatively less attention has been devoted to how customers maintain engagement, control, and coherent goal progression across digital–physical boundaries (Darvidou, 2024; Verhoef et al., 2021). This limitation is important because a technically connected retail system may still produce a psychologically fragmented customer journey. Accordingly, the central problem addressed in this study is how experiential continuity is maintained across digital and physical retail touchpoints and how this customer-side experience relates to subsequent customer outcomes in an omnichannel retail context.

1. LITERATURE REVIEW AND HYPOTHESES

The rapid expansion of omnichannel retailing has fundamentally transformed how customers interact with retailers across digital and physical environments. Customers increasingly navigate between mobile applications, websites, social commerce platforms, and physical stores within a single shopping journey, expecting continuity, consistency, and seamless integration throughout the experience (Darvidou, 2024; Gahler et al., 2023; Gao et al., 2021). However, the proliferation and integration of multiple touchpoints can also increase experiential complexity, as customers must navigate different interfaces, information structures, and interaction formats while expecting the overall journey to remain coherent and continuous (Darvidou, 2024; Gahler et al., 2023). When these touchpoints are poorly coordinated, inconsistencies in information, service processes, and channel interactions can fragment the customer experience and disrupt the continuity of the shopping journey (Darvidou, 2024; Gao et al., 2021). Consequently, as omnichannel ecosystems become increasingly interconnected and technologically sophisticated, retailers face the challenge

of moving beyond operational channel integration toward creating a customer journey that is experienced as coherent, continuous, and effortless across digital and physical touchpoints.

From a flow theory perspective, optimal experiences emerge when individuals become deeply absorbed in an activity and experience concentration, enjoyment, and a sense of control while pursuing their goals (Csikszentmihalyi & LeFevre, 1989; Novak et al., 2000). In online environments, flow has been conceptualized as an experiential state shaped by factors such as focused attention, interactivity, control, challenge, and telepresence, providing an important foundation for understanding how consumers remain engaged during technology-mediated experiences (Novak et al., 2000). However, limited attention has been devoted to understanding how flow can be maintained when customers move across multiple interconnected channels during hybrid shopping journeys. Unlike single-channel environments, hybrid retail contexts require customers to repeatedly adapt to changing interaction modes, interface structures, and service processes, thereby increasing the likelihood of experiential disruption during channel transitions (Gahler et al., 2023; Gao & Jiang, 2025).

In parallel, cognitive load theory explains that individuals possess limited cognitive processing capacity, and excessive cognitive demands reduce decision quality, task performance, and engagement (Sweller, 1988). Within omnichannel environments, customers are frequently required to reconcile information across channels, remember previous interactions, and reorient themselves during transitions between digital and physical touchpoints (Gao & Jiang, 2025). Such demands increase extraneous cognitive load and may interrupt the continuity necessary to sustain immersive shopping experiences. Prior research suggests that consistent information and well-connected touchpoints can reduce the difficulty and cognitive costs associated with navigating omnichannel services (Gao et al., 2021; Gao & Jiang, 2025). Consequently, the management of cognitive load becomes increasingly important in preserving experiential continuity across channels. Service-dominant logic further emphasizes that value is co-created through resource integration among actors within interconnected service ecosystems (Vargo & Lusch, 2015). In omnichannel retailing, customers integrate digital resources, physical interactions, technological systems, and service encounters throughout their shopping journeys (Hossain et al., 2019). From this perspective, customer experience quality does not solely depend on the effectiveness of individual channels, but rather on the retailer's ability to create integrated and coherent experiences across touchpoints.

Prior omnichannel research has therefore highlighted the importance of channel integration, information consistency, and process alignment in improving customer evaluations (Gao et al., 2021; Gahler et al., 2023; Hossain et al., 2019). Nevertheless, existing studies predominantly focus on operational integration and service efficiency, while giving relatively limited attention to the psychological experience customers encounter during transitions between channels. The increasing complexity of channel transitions further intensifies this issue. Customers intentionally switch between channels for convenience, information search, product evaluation, and experiential preferences (Aw et al., 2021; J. Wang & C. Wang, 2024). However, transition frictions such as information inconsistency, technological incompatibility, delayed synchronization, and fragmented service

processes can disrupt customer momentum and reduce experiential continuity (Darvidou, 2024; Gao & Jiang, 2025). Research on touchpoint consistency and connectivity demonstrates that consistency across touchpoints and seamless transitions contribute positively to omnichannel customer experience (Gao & Jiang, 2025). Similarly, research on customer-experience friction indicates that obstacles that resist customers' progress increase the effort required to move through the customer journey (Padigar et al., 2025). Although these studies contribute important insights regarding omnichannel operations, the literature remains fragmented regarding how transitional continuity contributes to sustaining psychological engagement across hybrid shopping journeys.

Despite advancements in omnichannel and hybrid retail research, significant gaps persist. Previous studies often focus on macro-level channel integration, neglecting micro-dynamics of customer transitions between digital and physical touchpoints. They emphasize structural aspects like information consistency and service quality, while the psychological aspects of channel transitions remain underexplored (Gahler et al., 2023; Gao et al., 2021; Gao & Jiang, 2025).

Channel transition smoothness, cognitive load management, temporal synchronicity, and technological friction have become increasingly important in omnichannel retail environments as customers navigate across interconnected digital and physical touchpoints within a single shopping journey. Modern omnichannel ecosystems require not only operational integration but also experiential continuity that enables customers to sustain engagement while transitioning between channels (Gahler et al., 2023; Gao & Jiang, 2025). In same-retailer hybrid shopping contexts, customers continuously interact with multiple interfaces, information structures, and service processes that must remain coherent throughout the journey. The absence of seamless integration may create interruptions, inconsistencies, and confusion that weaken customer engagement even when retailers provide high levels of service quality and channel functionality (Gao et al., 2021; Gao & Jiang, 2025). From a cognitive perspective, transitioning between channels requires customers to repeatedly reorient themselves, reconcile information,

and adapt to changing interaction formats, thereby consuming cognitive resources and disrupting experiential continuity (Gao & Jiang, 2025). Consequently, smooth transitions characterized by preserved context, informational consistency, and intuitive navigation become essential for supporting uninterrupted shopping experiences.

The interplay between channel transition smoothness, cognitive load management, temporal synchronicity, and technological friction illustrates the complexity of maintaining psychological continuity in hybrid retail ecosystems. Channel transition smoothness enables customers to move across channels without excessive disruption or redundancy, while cognitive load management minimizes unnecessary mental effort associated with fragmented information and complex system structures (Gao & Jiang, 2025). Temporal synchronicity further ensures that information remains current, aligned, and consistently updated across channels, thereby reducing uncertainty and strengthening customer confidence throughout the shopping process (Gao et al., 2021; Hossain et al., 2019). However, omnichannel environments are increasingly vulnerable to technological friction arising from authentication difficulties, interface complexity, system delays, compatibility issues, and unreliable functionality. Prior research on customer-experience friction indicates that friction can resist customers' goal progress and increase the effort required to continue through the customer journey (Padigar et al., 2025). In hybrid shopping journeys, these disruptions become particularly detrimental because interruptions during channel transitions may weaken customer momentum and diminish experiential continuity.

Flow theory provides an important theoretical foundation for explaining how customers sustain immersion and engagement throughout hybrid shopping journeys. Flow experiences emerge when individuals experience deep absorption, enjoyment, and focused progression toward desired goals without substantial interruption or distraction (Csikszentmihalyi & LeFevre, 1989; Novak et al., 2000). Within omnichannel environments, smooth transitions, manageable cognitive demands, synchronized information, and minimal technological obstacles collectively support the continuity necessary for maintaining flow states.

Conversely, abrupt transitions, excessive cognitive burdens, inconsistent information, and technological disruptions interrupt customer concentration and weaken immersive experiences. Prior studies demonstrate that customers evaluate omnichannel experiences more positively when channels provide consistent information and when customers can move smoothly across connected touchpoints (Gao et al., 2021; Gao & Jiang, 2025). Building on these theoretical foundations, this study conceptualizes Hybrid-Experience Fluency (HEF) as a customer-level experiential state in which flow-related qualities—such as engagement, perceived control, and effortless goal progression—are sustained across transitions between digital and physical touchpoints within the same retail journey. HEF extends the logic of traditional flow theory to hybrid environments, where customers must preserve experiential continuity while adapting to changes in interaction modalities, information formats, and service contexts (Csikszentmihalyi, 1990; Novak et al., 2000; Gahler et al., 2023). Drawing additionally on cognitive load theory, HEF recognizes that maintaining such continuity depends on customers' ability to navigate channel transitions without excessive cognitive reorientation or disruption (Sweller, 1988). Thus, HEF captures not merely immersion within a single activity or channel, but the maintenance of engagement, control, coherence, and goal-directed progression across interconnected digital–physical environments.

HEF is also distinct from related omnichannel and customer-experience constructs. Omnichannel integration quality and channel integration perceptions primarily capture customers' evaluations of how effectively a retailer coordinates information, processes, and interactions across channels (Hossain et al., 2019; Gao et al., 2021), whereas HEF captures the psychological experience that emerges as customers progress through those coordinated channels. Similarly, seamlessness concerns the continuity and consistency of the shopping journey and customers' ability to move across channels with minimal interruption (Cocco & Demoulin, 2022; Gao & Jiang, 2025), whereas HEF concerns whether customers can sustain coherent, goal-directed experiential momentum during those transitions. HEF is also distinct from customer journey continuity. Customer

journey continuity primarily concerns the preservation and connectedness of the customer journey across successive touchpoints (Lemon & Verhoef, 2016), whereas HEF captures the customer's psychological experience of maintaining coherent, goal-directed momentum while navigating those transitions. Journey continuity therefore characterizes the connectedness of the journey, while HEF characterizes how that continuity is psychologically experienced by the customer.

From a cognitive-processing perspective, HEF also differs from cognitive fluency. Whereas cognitive fluency concerns the subjective ease with which information is processed, HEF is situated specifically within digital-physical transitions and incorporates processing ease together with experiential continuity, sustained engagement, and goal-directed progression. Cognitive load theory nevertheless helps explain why excessive cognitive demands and reorientation can inhibit such experiential continuity (Sweller, 1988). Customer experience is a broader construct encompassing customers' cognitive, emotional, behavioral, sensory, and social responses across multiple touchpoints (Gahler et al., 2023; Lemon & Verhoef, 2016), whereas HEF represents a more specific transition-related psychological mechanism operating within that broader experience.

HEF must also be distinguished from perceived fluency and perceived flow. Perceived fluency in omnichannel research refers to customers' perceptions of natural and continuous transitions when switching channels and has been examined through task, content, interaction, cognition, and feeling fluency (Xuan et al., 2023). Li and Gong (2024) further distinguish perceived fluency from perceived flow by conceptualizing perceived fluency as a utilitarian value-in-context associated with ease and efficiency in information processing and channel transitions, whereas perceived flow represents a hedonic psychological state characterized by involvement, attention, control, and enjoyment. Building on these distinctions, HEF extends flow-related qualities to the hybrid digital-physical journey by focusing on customers' ability to sustain engagement, perceived control, coherence, and goal-directed progression while transitioning between heterogeneous channel environments. Thus, HEF is not equivalent to either per-

ceived fluency or traditional perceived flow; rather, it captures the maintenance of flow-related experiential qualities across interconnected digital and physical touchpoints.

Accordingly, HEF should not be interpreted as another label for traditional flow, perceived fluency, cognitive fluency, seamlessness, customer journey continuity, omnichannel integration quality, channel integration perception, or the broader customer-experience construct. Its conceptual domain lies at the intersection of these streams but centers specifically on whether customers can maintain coherent, goal-directed experiential momentum as they move between digital and physical environments within the same retailer journey. In the present model, channel transition smoothness, cognitive load management, temporal synchronicity, and technological friction therefore represent conditions that facilitate or inhibit HEF, whereas HEF represents the customer-side psychological mechanism through which these conditions are translated into subsequent customer outcomes.

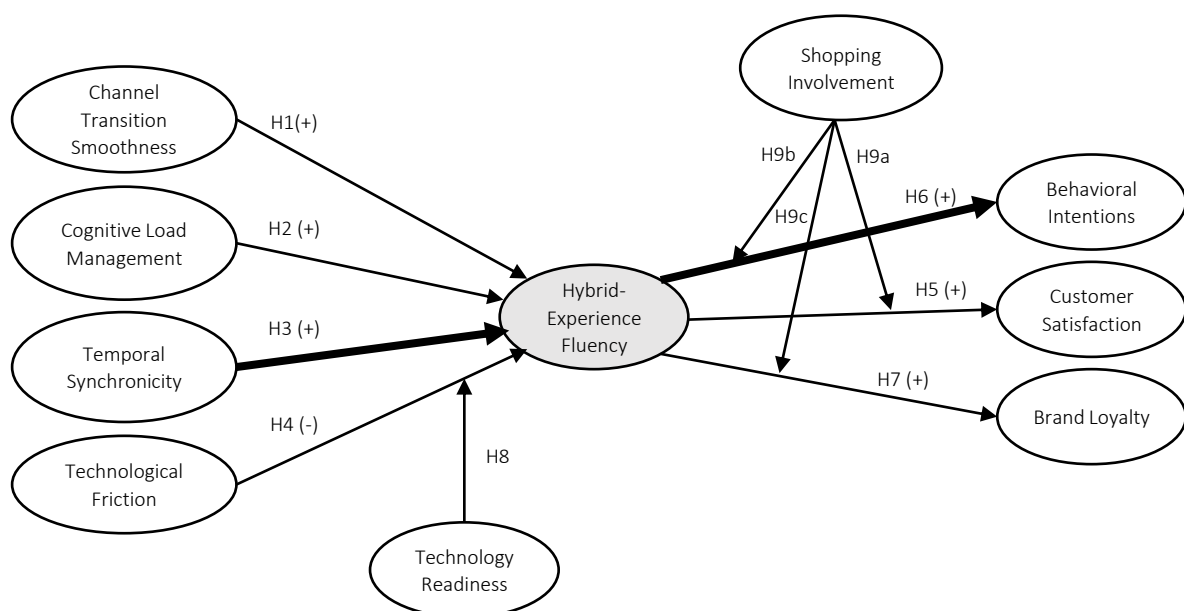
Hybrid-experience fluency is further expected to influence important customer outcomes within omnichannel retail ecosystems. Customer satisfaction reflects customers' evaluations of whether shopping experiences meet or exceed expectations and has consistently been associated with customer retention and positive word-of-mouth behavior (Gahler et al., 2023; Gao et al., 2021). Fluent hybrid experiences reduce frustration, simplify shopping processes, and generate rewarding interactions that improve customer evaluations (Padigar et al., 2025; Gao & Jiang, 2025). Similarly, behavioral intentions represent customers' likelihood of engaging in future behaviors such as repurchase, continued usage, and recommendation behavior (Gao et al., 2021). Customers who experience smooth and coherent hybrid shopping journeys are more likely to develop favorable evaluations of retailers and perceive future interactions as less effortful (Gao & Jiang, 2025; Padigar et al., 2025). In addition, brand loyalty increasingly depends on customers' cumulative experiences across interconnected touchpoints rather than solely on product-related attributes. Repeated fluent experiences can strengthen favorable customer responses and loyalty toward retailers (Gao & Huang, 2021; Lazaris et al., 2021).

Nevertheless, the influence of hybrid-experience fluency may vary depending on individual customer characteristics. Technology readiness reflects customers' propensity to embrace and use new technologies for accomplishing goals (Blut & Wang, 2020; Roy et al., 2018). Customers with higher technology readiness generally possess more favorable technology-related beliefs and greater adaptability when interacting with technological systems (Blut & Wang, 2020). Conversely, customers characterized by technology-readiness inhibitors such as discomfort and insecurity may respond less favorably to technological challenges (Blut & Wang, 2020). Similarly, shopping involvement shapes the extent to which customers pay attention to and process shopping-related information and experiences. Highly involved customers tend to engage in more extensive purchase decision processes and information processing than less involved customers (Laurent & Kapferer, 1985). Consequently, fluent hybrid experiences may exert stronger effects on satisfaction, behavioral intentions, and brand loyalty among customers with higher shopping involvement because these individuals are more sensitive to experiential continuity throughout the shopping journey.

Together, these findings highlight the growing importance of hybrid-experience fluency as a central mechanism explaining customer engagement within omnichannel retail ecosystems. Existing research has generally examined channel integration, service quality, technological adoption, and customer outcomes as separate constructs, while comparatively limited attention has been devoted to understanding how customers maintain psychological continuity across interconnected channels. To address this gap, the present study proposes a conceptual model in which channel transition smoothness, cognitive load management, temporal synchronicity, and technological friction influence hybrid-experience fluency, which subsequently affects customer satisfaction, behavioral intentions, and brand loyalty. Besides, technology readiness and shopping involvement are proposed as moderating variables shaping customer responses to hybrid shopping experiences.

Study hypotheses are as follows:

H1: Channel transition smoothness positively influences hybrid-experience fluency.



Note: Direct: H1: CTS → HEF; H2: CLM → HEF; H3: TS → HEF; H4: TF → HEF (-); H5: HEF → CS; H6: HEF → BI; H7: HEF → BL. Moderation: H8: TR × TF → HEF; H9a: SI × HEF → CS; H9b: SI × HEF → BI; H9c: SI × HEF → BL. CTS: Channel Transition Smoothness; CLM: Cognitive Load Management; TS: Temporal Synchronicity; TF: Technological Friction; HEF: Hybrid-Experience Fluency; CS: Customer Satisfaction; BI: Behavioral Intentions; BL: Brand Loyalty; TR: Technology Readiness; SI: Shopping Involvement.

Figure 1. Proposed Research Model

- H2: *Cognitive load management positively influences hybrid-experience fluency.*
- H3: *Temporal synchronicity positively influences hybrid-experience fluency.*
- H4: *Technological friction negatively influences hybrid-experience fluency.*
- H5: *Hybrid-experience fluency positively influences customer satisfaction.*
- H6: *Hybrid-experience fluency positively influences behavioral intentions.*
- H7: *Hybrid-experience fluency positively influences brand loyalty.*
- H8: *Technology readiness moderates the relationship between technological friction and hybrid-experience fluency, such that the negative effect of technological friction on hybrid-experience fluency is weaker for customers with higher technology readiness.*
- H9a: *Shopping involvement moderates the relationship between hybrid-experience fluency and customer satisfaction, such that the positive effect is stronger for customers with higher shopping involvement.*
- H9b: *Shopping involvement moderates the relationship between hybrid-experience fluency and behavioral intentions, such that the positive effect is stronger for customers with higher shopping involvement.*
- H9c: *Shopping involvement moderates the relationship between hybrid-experience fluency and brand loyalty, such that the positive effect is stronger for customers with higher shopping involvement.*

2. METHOD

2.1. Research design and sampling

Data were collected from July 2025 to January 2026 through an online questionnaire administered using Google Forms. The survey link was distributed through WhatsApp groups using a purposive

sampling approach to reach respondents with relevant hybrid-shopping experience. Respondents were required to: (1) be at least 18 years old; (2) have interacted with both the digital platform and physical store of the same retailer during the same shopping journey; and (3) have completed these interactions within a single shopping episode.

The respondents represented diverse age, occupational, and geographic groups. The largest age group was 18-24 years (47.7%), followed by 25-34 years (33.2%), 35-44 years (11.3%), and ≥45 years (7.8%). Students constituted 36.7% of the sample, followed by private-sector employees (27.5%), freelancers (11.1%), government/state-owned enterprise employees (8.7%), professionals (8.7%), entrepreneurs (3.8%), and housewives (3.5%). Most respondents were single (64.2%), while 35.8% were married. Geographically, 69.9% resided in Jabodetabek, followed by other areas of Java (16.2%) and Sumatra (9.0%), with the remaining respondents distributed across Bali/NTT/NTB, Sulawesi, Kalimantan, Papua, and Maluku. Regarding hybrid-shopping activity, 51.7% reported engaging with two to three retail stores, while fashion/apparel and beauty/cosmetics were the most frequently represented retail categories, followed by groceries/supermarkets, electronics/gadgets, health/personal care, furniture/home furnishing, books/stationery, and toys/hobbies. These characteristics indicate that the final sample encompassed consumers from varied age, occupational, and geographic groups with relevant experience across multiple hybrid retail contexts.

A total of 600 responses were initially collected. Prior to the PLS-SEM analysis, responses were screened for response quality. Twenty-five responses exhibiting invariant response patterns (straightlining), in which respondents selected the same scale point (e.g., 3, 4, or 5) across the questionnaire items, were excluded because these patterns indicated insufficient response differentiation across constructs and therefore raised concerns regarding response quality (Hair et al., 2022). Following this screening procedure, 575 valid responses were retained for the final analysis, representing 95.8% of the initially collected responses.

All constructs were measured using multi-item measures adapted or developed for the hybrid

Table 1. Demographic Profile of Respondents (n = 575)

Source: Table created by authors

Category	Classification	Frequency (n)	Percentage (%)
Age	18–24 years	274	47.7
	25–34 years	191	33.2
	35–44 years	65	11.3
	Above 45 years	45	7.8
Occupation	Students	211	36.7
	Private employees	158	27.5
	Freelancers	64	11.1
	Government / BUMN	50	8.7
	Professionals	50	8.7
	Entrepreneurs	22	3.8
	Housewives	20	3.5
Marriage Status	Single	369	64.2
	Married	206	35.8
Region of Residence	Jabodetabek	402	69.9
	Java	93	16.2
	Sumatra	52	9.0
	Bali / NTT / NTB	14	2.4
	Sulawesi	8	1.4
	Kalimantan	4	0.7
	Papua	2	0.3
	1 Store (Low)	118	20.5
Number of Retail Stores Visited	2–3 Stores (Moderate)	297	51.7
	>4 Stores (High)	160	27.8
Product Category (Hybrid Search; Multiple Responses Allowed)	Fashion / Apparel	312	54.3
	Beauty Care / Cosmetics	268	46.6
	Groceries / Supermarket	245	42.6
	Electronics / Gadgets	198	34.4
	Furniture / Home Furnishing	142	24.7
	Health / Personal Care	176	30.6
	Books & Stationery	121	21.0
	Toys & Hobbies	88	15.3

retail context. Channel Transition Smoothness was measured using five items informed by Gao et al. (2021) and Gao and Jiang (2025), assessing seamless movement between digital and physical channels. Cognitive Load Management employed five items grounded in Sweller (1988) and Gao and Jiang (2025), capturing consumers' perceived mental effort during cross-channel shopping. Temporal Synchronicity utilized five items developed based on channel integration and touchpoint consistency research (Gao et al., 2021; Gao & Jiang, 2025), measuring the consistency and timely alignment of information, product availability, promotions, and prices across channels. Technological Friction was assessed using five items informed by Padigar et al. (2025), focusing on technology-related disruptions during the shopping process.

Hybrid-Experience Fluency was measured using six items developed for this study and informed

by Novak et al. (2000), Verhoef et al. (2009), and Gahler et al. (2023), capturing flow-related engagement, perceived control, and experiential continuity throughout the hybrid shopping journey. Customer Satisfaction employed four items informed by Pei et al. (2020), while Behavioral Intentions used five items informed by Nguyen et al. (2024). Brand Loyalty was measured using five items informed by Gao and Huang (2021) and Lazaris et al. (2021). Technology Readiness and Shopping Involvement were measured using five items each, informed by Blut and Wang (2020) and Roy et al. (2018), and Laurent and Kapferer (1985), respectively. All items utilized a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

The analysis followed the PLS-SEM assessment procedures recommended by Hair et al. (2022), including evaluation of indicator reliability, com-

posite reliability, AVE, HTMT, bootstrapping (10,000 resamples), R^2 , f^2 , and Q^2_{predict} . In addition to the hypothesized structural relationships, specific indirect effects through HEF were examined using bootstrapping as a supplementary analysis. Because mediation was not formulated as a separate hypothesis in the original conceptual framework, these indirect effects were used to provide additional evidence regarding HEF's proposed role as an experiential mechanism rather than as confirmatory tests of separately specified mediation hypotheses. Moderation analysis examined interaction effects using mean-centered variables to reduce multicollinearity. Effect sizes were further evaluated using f^2 and R^2 to determine practical significance beyond statistical significance. Additional analysis included Importance–Performance Map Analysis (IPMA) to identify antecedents with relatively high importance but lower performance, thereby providing additional managerial prioritization insights (Martilla & James, 1977; Hair et al., 2024).

3. RESULTS

3.1. Measurement model assessment

The measurement model was assessed for indicator reliability, convergent validity, internal consistency reliability, and discriminant validity following Hair et al. (2022). Indicator reliability was established, as all outer loadings exceeded the recommended threshold of 0.708, ranging from 0.744 to 0.911. Convergent validity was also established, with Average Variance Extracted (AVE) values ranging from 0.636 to 0.694, exceeding the recommended threshold of 0.50. Internal consistency reliability was satisfactory across all constructs, with composite reliability values ranging from 0.857 to 0.919 and Cronbach's alpha values ranging from 0.750 to 0.905. These results indicate satisfactory indicator reliability, internal consistency reliability, and convergent validity for all constructs included in the measurement model.

Table 2. Reliability and validity

Construct	Cronbach's α	CR	AVE
Channel Transition Smoothness	0.868	0.904	0.654
Cognitive Load Management	0.865	0.903	0.650
Temporal Synchronicity	0.890	0.916	0.644
Technological Friction	0.905	0.918	0.694
Hybrid-Experience Fluency	0.894	0.919	0.655
Customer Satisfaction	0.750	0.857	0.666
Behavioral Intentions	0.878	0.911	0.673
Brand Loyalty	0.894	0.919	0.654
Technology Readiness	0.857	0.897	0.636
Shopping Involvement	0.876	0.910	0.668

Table 3. Discriminant validity (HTMT)

	BI	BL	CTS	CLM	SAT	HEF	SI	TF	TR	TS
BI										
BL	0.825									
CTS	0.464	0.472								
CLM	0.621	0.605	0.516							
SAT	0.447	0.470	0.464	0.516						
HEF	0.793	0.752	0.621	0.647	0.553					
SI	0.392	0.396	0.077	0.289	0.271	0.241				
TF	0.044	0.051	0.145	0.152	0.033	0.052	0.093			
TR	0.357	0.357	0.265	0.383	0.701	0.392	0.246	0.054		
TS	0.532	0.513	0.343	0.433	0.423	0.590	0.286	0.352	0.202	

Note: HTMT values are reported for the substantive latent constructs; interaction terms used in the moderation analysis are excluded.

Discriminant validity was assessed using the heterotrait-monotrait ratio (HTMT). All HTMT values were below the recommended threshold, indicating adequate discriminant validity among the substantive latent constructs (Hair et al., 2022). Interaction terms used in the moderation analysis were excluded from the HTMT assessment because they represent product terms created to estimate moderating effects rather than substantive latent constructs requiring separate discriminant-validity assessment (Hair et al., 2022).

3.2. Structural model and hypotheses testing

Before assessing the structural relationships, collinearity among the predictor constructs was examined using the inner Variance Inflation Factor (VIF). The VIF values ranged from 1.023 to 1.449, remaining well below the recommended threshold, indicating that collinearity was not a concern in the structural model (Hair et al., 2022). The structural model explained 58.1% of the variance in Hybrid-Experience Fluency ($R^2 = .581$), 54.0% in Behavioral Intentions ($R^2 = 0.540$), 50.4% in Brand Loyalty ($R^2 = 0.504$), and 24.9% in Customer Satisfaction ($R^2 = 0.249$). (Hair et al., 2022). PLSpredict produced positive Q^2 predict values for Hybrid-Experience Fluency (0.565), Behavioral Intentions (0.443), Brand Loyalty (0.434), and Customer Satisfaction (0.282), indicating out-of-sample predictive relevance (Shmueli et al., 2019).

As presented in Table 4, Channel Transition Smoothness ($\beta = 0.311$, $t = 10.754$), Cognitive Load Management ($\beta = 0.281$, $t = 9.214$), and Temporal

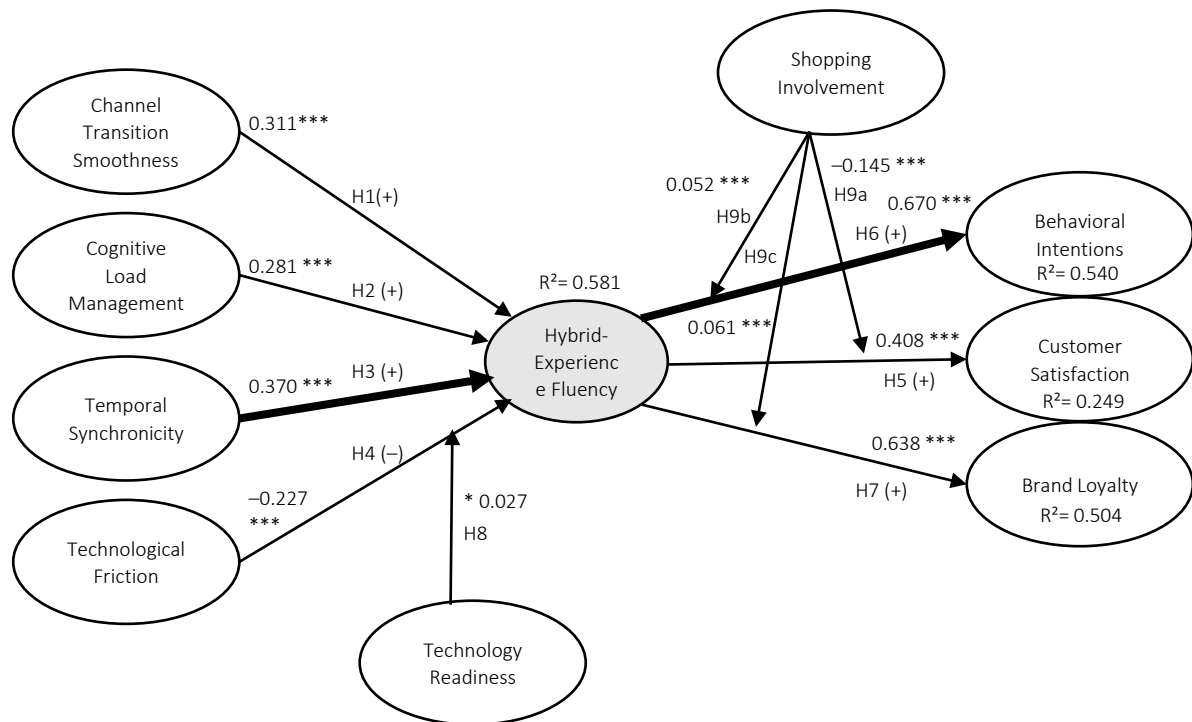
Synchronicity ($\beta = 0.370$, $t = 10.815$) significantly enhanced Hybrid-Experience Fluency, while Technological Friction negatively influenced fluency ($\beta = -0.227$, $t = 3.491$), supporting *H1–H4*. Hybrid-Experience Fluency further exerted strong positive effects on Customer Satisfaction ($\beta = 0.408$), Behavioral Intentions ($\beta = 0.670$), and Brand Loyalty ($\beta = 0.638$), supporting *H5–H7*. Effect size analysis revealed particularly strong practical influence on Behavioral Intentions ($f^2 = 0.914$) and Brand Loyalty ($f^2 = 0.768$). Moderation analysis showed that Technology Readiness did not significantly moderate the effect of Technological Friction on Hybrid-Experience Fluency, and therefore *H8* was not supported. However, Shopping Involvement significantly moderated the relationships between Hybrid-Experience Fluency and all three customer outcomes; however, *H9a* was not supported because the significant effect on Customer Satisfaction was opposite to the hypothesized direction, whereas *H9b* and *H9c* were supported.

Moderation analysis examined the roles of Technology Readiness and Shopping Involvement. Technology Readiness did not significantly moderate the relationship between Technological Friction and Hybrid-Experience Fluency ($\beta = 0.027$, $t = 0.887$, one-tailed $p = 0.187$); therefore, *H8* was not supported. This indicates that there is insufficient evidence that technology readiness reduces the negative effect of technological friction on Hybrid-Experience Fluency. Shopping Involvement significantly moderated the relationship between Hybrid-Experience Fluency and Customer Satisfaction ($\beta = -0.145$, $t = 3.889$, $p <$

Table 4. Structural model path coefficients

Relationship	β	t-value	VIF	f^2	R^2	Q^2 predict	Result
<i>H1</i> : Channel Transition Smoothness → Hybrid-Experience Fluency	0.311	10.754	1.298	0.156	0.581	0.565	Supported
<i>H2</i> : Cognitive Load Management → Hybrid-Experience Fluency	0.281	9.214	1.449	0.129	0.581	0.565	Supported
<i>H3</i> : Temporal Synchronicity → Hybrid-Experience Fluency	0.370	10.815	1.310	0.214	0.581	0.565	Supported
<i>H4</i> : Technological Friction → Hybrid-Experience Fluency	-0.227	3.491	1.113	0.081	0.581	0.565	Supported
<i>H5</i> : Hybrid-Experience Fluency → Customer Satisfaction	0.408	10.650	1.070	0.207	0.249	0.282	Supported
<i>H6</i> : Hybrid-Experience Fluency → Behavioral Intentions	0.670	29.520	1.070	0.914	0.540	0.443	Supported
<i>H7</i> : Hybrid-Experience Fluency → Brand Loyalty	0.638	24.576	1.070	0.768	0.504	0.434	Supported

Note: p-values are based on one-tailed bootstrapping tests.



Note(s): *** = significant-supported; * = not significant-rejected.

Figure 2. Structural Model Results and Hypothesis Testing

Table 5. Moderation analysis results

Relationship	β	t-values	VIF	p-values	CI (95%)	Result
H8: Technology Readiness x Technological Friction $\rightarrow$ Hybrid-Experience Fluency	0.027	0.887	1.080	0.187	[-0.018; 0.082]	Not Supported
H9a: Shopping Involvement x Hybrid-Experience Fluency $\rightarrow$ Customer Satisfaction	-0.145	3.889	1.023	0.001	[-0.204; -0.081]	Not supported (opposite direction)
H9b: Shopping Involvement x Hybrid-Experience Fluency $\rightarrow$ Behavioral Intentions	0.052	2.502	1.023	0.006	[0.017; 0.085]	Supported
H9c: Shopping Involvement x Hybrid-Experience Fluency $\rightarrow$ Brand Loyalty	0.061	2.457	1.023	0.007	[0.021; 0.102]	Supported

Note: p-values are based on one-tailed bootstrapping tests.

0.001, 95% CI [-0.204, -0.081]); however, the direction of the effect was opposite to that predicted in H9a. Therefore, H9a was not supported. In contrast, Shopping Involvement positively moderated the relationships between Hybrid-Experience Fluency and Behavioral Intentions ($\beta = 0.052$, $t = 2.502$, $p = 0.006$, 95% CI [0.017, 0.085]) and Brand Loyalty ($\beta = 0.061$, $t = 2.457$, $p = 0.007$, 95% CI [0.021, 0.102]), supporting H9b and H9c, respectively.

Although mediation was not formulated as a separate hypothesis in the original conceptual framework, the sequential structure of the model implies potential indirect relationships between the four antecedents and customer outcomes through

HEF. Therefore, specific indirect effects were examined as a supplementary analysis using the bootstrapping procedure. As shown in Table 6, all twelve specific indirect effects through HEF were statistically significant ($p < 0.000$). Temporal Synchronicity produced the strongest positive indirect effects on Behavioral Intentions ($\beta = 0.248$), Customer Satisfaction ($\beta = 0.151$), and Brand Loyalty ($\beta = 0.236$). Channel Transition Smoothness and Cognitive Load Management also showed significant positive indirect effects on all three customer outcomes. In contrast, Technological Friction exhibited significant negative indirect effects on Behavioral Intentions ($\beta = -0.152$), Customer Satisfaction ($\beta = -0.093$), and

Table 6. Specific indirect effects through Hybrid-Experience Fluency

Specific indirect effect	β	t-value	p-value
CTS $\rightarrow$ HEF $\rightarrow$ BI	0.208	10.093	0.000
CLM $\rightarrow$ HEF $\rightarrow$ BI	0.188	8.545	0.000
TS $\rightarrow$ HEF $\rightarrow$ BI	0.248	10.246	0.000
TF $\rightarrow$ HEF $\rightarrow$ BI	-0.152	3.488	0.000
CTS $\rightarrow$ HEF $\rightarrow$ CS	0.127	7.608	0.000
CLM $\rightarrow$ HEF $\rightarrow$ CS	0.114	7.007	0.000
TS $\rightarrow$ HEF $\rightarrow$ CS	0.151	7.796	0.000
TF $\rightarrow$ HEF $\rightarrow$ CS	-0.093	3.405	0.000
CTS $\rightarrow$ HEF $\rightarrow$ BL	0.198	9.821	0.000
CLM $\rightarrow$ HEF $\rightarrow$ BL	0.179	8.417	0.000
TS $\rightarrow$ HEF $\rightarrow$ BL	0.236	10.065	0.000
TF $\rightarrow$ HEF $\rightarrow$ BL	-0.145	3.464	0.000

Note: CTS = Channel Transition Smoothness; CLM = Cognitive Load Management; TS = Temporal Synchronicity; TF = Technological Friction; HEF = Hybrid-Experience Fluency; BI = Behavioral Intentions; CS = Customer Satisfaction; BL = Brand Loyalty.

Brand Loyalty ($\beta = -0.145$). These supplementary findings provide empirical evidence consistent with HEF's proposed role as a customer-side experiential mechanism through which hybrid retail conditions are associated with subsequent customer outcomes.

3.3. IPMA

IPMA was conducted to complement the structural model by jointly considering the importance and performance of the antecedent constructs (Hair et al., 2022). For Hybrid-Experience Fluency, Temporal Synchronicity showed the highest importance (0.370) but a comparatively lower performance score (53.736) than Channel Transition Smoothness (importance = 0.311; performance = 67.281) and Cognitive Load Management (importance = 0.281; performance = 66.870). This pattern identifies Temporal Synchronicity as a particularly relevant improvement priority for strengthening HEF. At the customer-outcome level, HEF showed the highest importance for Behavioral

Intentions (0.670), Customer Satisfaction (0.408), and Brand Loyalty (0.638), with a performance score of 54.112. These results suggest that managerial improvements directed toward temporal synchronization and the resulting hybrid-experience fluency may offer particularly relevant opportunities for enhancing customer outcomes.

4. DISCUSSION

This study examines Hybrid-Experience Fluency (HEF) as a customer-side experiential mechanism through which consumers maintain engagement, perceived control, coherence, and goal-directed progression across digital and physical retail touchpoints. Channel Transition Smoothness ($\beta = 0.311$), Cognitive Load Management ($\beta = 0.281$), and Temporal Synchronicity ($\beta = 0.370$) positively influenced HEF, whereas Technological Friction negatively influenced it ($\beta = -0.227$). These findings are consistent with prior omnichannel research showing that connected touchpoints, in-

Table 7. IPMA

Predecessor constructs	Selected target constructs							
	Hybrid-Experience Fluency		Behavioral Intentions		Customer Satisfaction		Brand Loyalty	
	IMP	PERF	IMP	PERF	IMP	PERF	IMP	PERF
Channel Transition Smoothness	0.311	67.281	0.208	67.281	0.127	67.281	0.198	67.281
Cognitive Load Management	0.281	66.870	0.188	66.870	0.114	66.870	0.179	66.870
Temporal Synchronicity	0.370	53.736	0.248	53.736	0.151	53.736	0.236	53.736
Technological Friction	-0.227	43.060	-0.152	43.060	-0.093	43.060	-0.145	43.060
Hybrid-Experience Fluency			0.670	54.112	0.408	54.112	0.638	54.112

Note: IMP = Importance; PERF = Performance.

formation consistency, and smooth cross-channel transitions contribute to coherent customer experiences (Gao et al., 2021; Gao & Jiang, 2025). Recent empirical evidence in the Indonesian hybrid retail context similarly indicates that channel integration, information transparency, and ease of access are important elements of the cross-channel customer experience, while inconsistencies in stock and promotional information remain significant challenges (Andania & Wahyuni Syam, 2025). They also support cognitive load theory, whereby reducing unnecessary processing demands helps preserve cognitive resources required for continued engagement (Sweller, 1988). The present findings extend this literature by showing that these conditions are associated not only with customers' evaluations of channel integration but also with their ability to sustain an experiential state across digital-physical transitions.

Among the antecedents, temporal synchronicity was the strongest predictor of HEF. This result is consistent with prior research emphasizing information consistency and coordination across interconnected channels (Gao et al., 2021; Hossain et al., 2019). Timely alignment of product availability, prices, promotions, and other journey information can reduce the need for customers to interrupt their progression and reassess previous decisions. This interpretation is also supported by recent empirical evidence showing that synchronization of stock and promotional information and service consistency remain critical challenges in hybrid retail journeys (Andania & Wahyuni Syam, 2025). Conversely, the negative relationship between technological friction and HEF is consistent with empirical evidence that customer-experience friction increases the effort required to progress through a journey (Padigar et al., 2025). Together, these results indicate that experiential continuity depends not merely on providing multiple integrated channels but on enabling customers to move across them without substantial temporal inconsistency, cognitive reorientation, or technological disruption.

HEF positively influenced customer satisfaction ($\beta = 0.408$), behavioral intentions ($\beta = 0.670$), and brand loyalty ($\beta = 0.638$), with its strongest relationship observed for behavioral intentions. These findings correspond with previous research link-

ing coherent omnichannel experiences with favorable evaluations and behavioral responses (Gahler et al., 2023; Gao et al., 2021; Gao & Jiang, 2025) and integrated retail experiences with loyalty (Gao & Huang, 2021; Lazaris et al., 2021). More recent empirical evidence further demonstrates that omnichannel customer experience contributes to customer engagement and that consumers' engagement across multiple retail channels represents an important behavioral consequence of the omnichannel experience (Rahman et al., 2025). The contribution of the present study lies in identifying HEF as a specific transition-related experiential state associated with these outcomes. The model explained more variance in behavioral intentions ($R^2 = 0.540$) and brand loyalty ($R^2 = 0.504$) than in customer satisfaction ($R^2 = 0.249$), suggesting that satisfaction may depend on additional evaluative factors not represented in the present model.

The moderation findings reveal important boundary conditions. Technology readiness did not moderate the relationship between technological friction and HEF ($\beta = 0.027$, $p = 0.187$); therefore, H8 was not supported. This differs from the expectation that technologically ready customers would be more resilient to technological difficulties. Previous empirical research indicates that technology readiness influences consumer responses to retail technologies and omnichannel experiences (Hickman et al., 2020; Roy et al., 2018). The present result suggests a boundary to this expectation: technology readiness may facilitate general receptiveness toward retail technologies without necessarily protecting customers from system-generated friction during an ongoing hybrid journey. Retailer-side problems such as system delays, authentication difficulties, or unreliable functionality may remain disruptive even for technologically confident consumers. This interpretation warrants further empirical examination.

Shopping involvement produced different moderating effects across customer outcomes. It strengthened the relationships between HEF and behavioral intentions ($\beta = 0.052$, $p = 0.006$) and between HEF and brand loyalty ($\beta = 0.061$, $p = 0.007$), consistent with the proposition that highly involved consumers process shopping experiences more extensively (Laurent & Kapferer, 1985).

Recent empirical evidence also indicates that shopping involvement can condition how immersive experiential states translate into subsequent consumer responses (He, 2026). However, shopping involvement weakened rather than strengthened the HEF–customer satisfaction relationship ($\beta = -0.145$, $p < 0.000$). Thus, H9a was not supported in its hypothesized positive direction. This finding is particularly important because it demonstrates that involvement does not uniformly amplify HEF outcomes. Demoulin and Willems (2019) found that experiential irritants had stronger implications for satisfaction in high-involvement retail settings, suggesting that involvement can heighten sensitivity to experiential conditions. Accordingly, highly involved customers may apply greater scrutiny when evaluating hybrid journeys, weakening the extent to which HEF translates into satisfaction. Because evaluative scrutiny was not directly measured, this explanation remains interpretive. Overall, the findings suggest that shopping involvement represents an outcome-specific boundary condition rather than a uniformly positive amplifier of HEF.

Theoretically, the findings extend omnichannel research by distinguishing the structural integration of channels from customers' experiential state while progressing through them. Whereas prior research emphasizes channel integration, touchpoint connectivity, information consistency, and seamlessness (Hossain et al., 2019; Gao et al., 2021; Gao & Jiang, 2025), HEF captures whether customers sustain engagement, perceived control, coherence, and goal-directed progression across

digital–physical transitions. The findings also extend the application of flow theory from experiences within individual environments to interconnected hybrid journeys (Csikszentmihalyi & LeFevre, 1989; Novak et al., 2000). HEF therefore does not replace traditional flow, perceived fluency, seamlessness, or channel integration; rather, it captures the maintenance of flow-related experiential qualities as customers transition between heterogeneous digital and physical environments. The significant role of cognitive load management further supports the relevance of cognitive load theory for understanding cross-channel experiential continuity (Sweller, 1988; Gao & Jiang, 2025).

Managerially, retailers should manage hybrid journeys as interconnected experiences rather than optimize channels independently. The strong role of temporal synchronicity emphasizes the need for timely and consistent product availability, prices, promotions, and transaction information across touchpoints. This recommendation is reinforced by recent Indonesian evidence showing that stock and promotional synchronization and service consistency remain practical challenges in hybrid retailing (Andania & Wahyuni Syam, 2025). Retailers should also reduce technological friction and unnecessary cognitive demands by simplifying cross-channel navigation, preserving relevant customer and transaction information, and minimizing repeated procedures. Because HEF is strongly associated with behavioral intentions and brand loyalty, improving these conditions can support both experiential continuity and longer-term customer relationships.

CONCLUSION

This study aimed to examine how Hybrid-Experience Fluency (HEF) operates as a customer-side experiential mechanism linking digital-physical retail conditions with customer outcomes in same-retailer hybrid shopping journeys. The findings show that temporal synchronicity, channel transition smoothness, and cognitive load management strengthen HEF, while technological friction weakens it. HEF, in turn, is positively associated with customer satisfaction, behavioral intentions, and brand loyalty, with the strongest relationship observed for behavioral intentions.

These results indicate that effective omnichannel retailing depends not only on structural channel integration but also on customers' ability to maintain engagement, perceived control, coherence, and goal-directed progression while moving between digital and physical touchpoints. Accordingly, retailers should prioritize synchronized information, smooth transitions, reduced cognitive demands, and lower technological friction when designing hybrid shopping journeys. The results also show that the effects of

HEF are not uniform across customer conditions, as technology readiness did not buffer technological friction and shopping involvement produced different moderating patterns across customer outcomes.

The study is limited by its cross-sectional design, single-country context, and the lower proportion of explained variance in customer satisfaction relative to the other outcomes. Future research should therefore test the model longitudinally and across different cultural and retail contexts and examine additional experiential or evaluative factors that may explain customer satisfaction and the boundary conditions of HEF more fully.

AUTHOR CONTRIBUTIONS

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 Writing – original draft: Juniarty.
 Writing – review & editing: Juniarty.

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AI USAGE STATEMENT

This manuscript was edited and proofread using artificial intelligence–assisted writing tools, including Grammarly, solely for language refinement, grammar correction, and proofreading purposes. All conceptual development, theoretical framing, research design, data analysis, interpretation of findings, and final scholarly decisions were conducted entirely by the authors.

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