Antecedents and Impacts of Digital Customer Experience in Youth E-Commerce Engagement

Zulfahmi[1], Hubertina Karolina Ngarbingan[1*] (iD), Ginta Ginting[1] (iD), Maya Maria[1] (iD)
[1]Universitas Terbuka, South Tangerang City, Banten Province, 15437, Indonesia
*Corresponding Email: hubertinacarol@gmail.com

ARTICLE INFORMATION

ABSTRACT

The rapid growth of e-commerce has strengthened the role of digital customer experience (DCX) in shaping customer loyalty and competitive advantage. This study aims to examine the relationships among online flow state, value co-creation, DCX, and customer loyalty. A quantitative survey was conducted with 182 respondents aged 17–45 years in Jakarta and the surrounding areas. Data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM). The results indicate that online flow state significantly affects value co-creation (β = 0.760; t = 7.543; p < 0.001) and customer loyalty (β = 0.347; t = 4.082; p < 0.001). Value co-creation significantly influences DCX (β = 0.874; t = 18.412; p < 0.001), and DCX significantly affects customer loyalty (β = 0.630; t = 7.211; p < 0.001). Indirect effects are also significant, as online flow state influences DCX through value co-creation (β = 0.664; t = 5.577; p < 0.001), value co-creation affects customer loyalty through DCX (β = 0.550; t = 7.389; p < 0.001), and online flow state influences customer loyalty through the sequential mediation of value co-creation and DCX (β = 0.418; t = 5.447; p < 0.001). The model explains 57.8% of the variance in value co-creation, 76.3% in DCX, and 91.1% in customer loyalty. These findings highlight the importance of designing immersive digital experiences that encourage active participation to strengthen customer loyalty and long-term performance.

Keywords: Customer Loyalty; Digital Customer Experience; Online Flow State; Value Co-Creation; PLS-SEM

INTRODUCTION

Digital transformation in Indonesia has accelerated the expansion of the e-commerce sector, intensifying competition among dominant platforms such as Shopee and Tokopedia. Over the past five years, the industry has become increasingly competitive, compelling platforms to differentiate themselves through promotional strategies, ecosystem integration, and digital service innovation. In such an environment, competitive advantage is no longer derived solely from price competition or promotional intensity, but increasingly from the quality of digital interaction and the overall experience delivered to users. As competition intensifies, understanding the mechanisms that shape customer loyalty in digital environments becomes strategically important.

While prior research has examined determinants of e-commerce performance and digital consumer behavior, limited attention has been devoted to understanding how psychological experience (online flow), participatory engagement (value co-creation), and digital customer experience (DCX) operate within an integrated structural framework. Existing studies frequently investigate these constructs independently, thereby providing fragmented explanations of consumer behavior in digital contexts. Such separation limits the ability to explain how experiential immersion, interactive participation, and holistic evaluation collectively influence customer loyalty. This conceptual fragmentation indicates the need for a comprehensive model that captures the sequential processes linking experiential states to behavioral outcomes.

The rapid development of e-commerce adoption among young consumers, particularly Generation Z and Millennials, reflects substantial changes in shopping behavior and brand interaction patterns. Online shopping has increasingly become embedded within lifestyle practices characterized by digital connectivity, reliance on social media, responsiveness to promotional stimuli, and preference for interactive engagement. Prior studies (Dwita & Mourbas, 2022; Faizah & Aisyah, 2023; Gefen, 2002) suggest that e-commerce providers must design strategies capable of strengthening loyalty during the early stages of the consumer lifecycle (ages 18–25), where brand commitment remains dynamic and susceptible to competitive influence.

Despite promising market potential, competitive intensity presents persistent structural challenges (Chen et al., 2020; Gefen, 2002; Urdea & Constantin, 2021). Chen et al. (2020) describe electronic retailing as characterized by high competition, elevated customer expectations, and technological complexity. Under such conditions, maintaining stable customer loyalty becomes increasingly difficult. Maylinda and Andarini (2024) emphasize that strengthening customer experience as a multidimensional construct, alongside enhancing AI-driven personalization, plays a central role in attracting and retaining consumers within digital marketplaces.

Demographically, young generations represent a pivotal segment shaping patterns of technological consumption. Generation Z, often referred to as the "Internet Generation," demonstrates lifestyle orientations influenced by continuous digital exposure. Jayatissa (2023) notes that this cohort values independent thinking, creativity, personal expression, and privacy. In Indonesia, approximately 70% of the population falls within the productive age range (15–64 years), with demographic dominance from Generation Z, Millennials, and Generation X (Central Agency of Statistics of Indonesia [BPS Indonesia], 2023). This demographic composition reinforces the importance of examining experiential and participatory mechanisms that shape digital engagement and loyalty formation.

Prior research (Hilal & Varela-Neira, 2022; Maylinda & Andarini, 2024) indicates unresolved questions concerning how digital experiences are formed and how they translate into relational outcomes. Contemporary consumers increasingly seek active participation in their purchase journeys, independently accessing information, comparing alternatives, and conducting transactions. Consequently, digital platforms must facilitate interactive structures that enable users to engage meaningfully throughout their journey.

Within digital service systems, the customer journey encompasses multiple interconnected touchpoints across platforms and channels. However, previous studies have not comprehensively clarified how experiential and participatory factors operate across these stages, particularly in environments characterized by heterogeneous user expectations and rapid technological evolution. Addressing such complexity requires integrating advanced digital technologies, including artificial intelligence and big data analytics, to enhance behavioral insight and service performance (Akter et al., 2016; Davis, 1989; Guo & Pole, 2009; Verhoef et al., 2021).

Beyond empirical considerations, DCX research requires stronger theoretical articulation. Rather than conceptualizing DCX as an isolated evaluative outcome, it is necessary to situate it within a broader explanatory framework that accounts for cognitive processing, experiential immersion, and interactive participation. To achieve this, the present study integrates Information Integration Theory, Multi-Attribute Utility Theory, Value Co-Creation Theory, and Flow Theory to construct a multidimensional explanation of digital experience formation and its behavioral implications.

Information Integration Theory explains that individuals synthesize multiple informational cues by assigning different weights before forming overall judgments (Iriani, 2025; Schweidel & Moe, 2014). In digital environments, consumers simultaneously evaluate interface usability, response speed, personalization features, content relevance, and functional reliability. These elements are cognitively integrated into an overall assessment that shapes perceptions of digital experience quality.

Multi-Attribute Utility Theory further explains that consumers evaluate alternatives by comparing multiple attributes to determine overall utility. In e-commerce contexts, attributes such as interface design, service quality, and perceived value influence satisfaction and behavioral intentions (Kandil et al., 2024; Nursalim et al., 2025). Each attribute carries varying degrees of importance, and collective evaluation shapes subsequent loyalty-related decisions.

Value Co-Creation Theory (Ramaswamy & Ozcan, 2020; Vargo & Lusch, 2017) conceptualizes value as emerging through interactive processes between firms and consumers. In e-commerce environments, value formation occurs through browsing activities, product reviews, customization, feedback mechanisms, and post-purchase interaction. Particularly among younger consumers, value increasingly depends on participatory involvement rather than passive consumption, suggesting that engagement plays a central role in shaping digital experience outcomes.

Flow Theory (Csikszentmihalyi, 2000) introduces an experiential dimension by explaining how deep involvement and focused attention arise when task challenges align with individual capabilities. In online shopping environments, immersive experiences may emerge when platform design and user skills are well-balanced. Such experiential states can enhance engagement intensity and influence subsequent behavioral responses, including relational continuity and loyalty.

Taken together, these theoretical perspectives provide complementary explanations of how digital experiences are cognitively evaluated, experientially lived, and interactively constructed. However, limited empirical research has integrated these frameworks into a unified structural model that simultaneously examines experiential antecedents (online flow state), participatory mechanisms (value co-creation), holistic digital evaluation (DCX), and behavioral consequences (customer loyalty). The absence of such integration constrains understanding of the sequential pathways through which immersive digital experiences translate into sustained loyalty.

Accordingly, the primary objective of this study is to develop and empirically test an integrated structural model explaining the antecedents and consequences of DCX within Indonesia's e-commerce context. Specifically, this research investigates how online flow state influences value co-creation and DCX, how DCX affects customer loyalty, and how mediation mechanisms operate across these constructs. The novelty of this study lies in positioning DCX as both an outcome of experiential and participatory processes and a determinant of loyalty within a sequential explanatory framework grounded in multiple complementary theories.

The significance of this research extends to both theoretical and managerial domains. Theoretically, this study advances digital marketing and customer experience literature by integrating Information Integration Theory, Multi-Attribute Utility Theory, Value Co-Creation Theory, and Flow Theory into a coherent explanatory structure that captures cognitive, experiential, and interactive dimensions simultaneously. Methodologically, the examination of direct and sequential mediation pathways provides deeper insight into causal relationships that have received limited empirical testing in DCX research. Managerially, the findings are expected to inform e-commerce practitioners in designing immersive digital environments, facilitating meaningful customer participation, and structuring digital interactions that foster long-term loyalty in highly competitive markets.

LITERATURE REVIEW

Digital Customer Experience (DCX)
DCX is a concept that emphasizes how service providers shape customer interactions and experiences through digital technologies; it highlights that digital touchpoints such as websites, mobile apps, and social media collectively shape customers' perceptions and evaluations of a brand (Mahmoud & Baqer, 2025). According to Klaus and Maklan (2012), customer experience comprises three key dimensions: post-purchase experience, brand experience, and service experience. Meanwhile, Silalahi and Rufaidah (2017) identified five essential DCX dimensions in their study, namely digital service experience, digital image experience, digital touchpoint experience, and digital broadband experience.

Synthesizing insights from various scholars, DCX encompasses customer experiences formed through interactions across diverse digital platforms provided by service providers. These experiences include all forms of customer engagement with businesses through websites, mobile applications, social media, and other digital devices used to communicate or purchase products and services. Several authors (Bolton et al., 2018; Kitsios et al., 2021; Lemon & Verhoef, 2016; Silalahi & Rufaidah, 2017) affirm that DCX explains how digital technologies shape customer interactions and experiences. Key elements of DCX include: (1) Personalization – tailoring customer experiences to individual needs and preferences; (2) Omnichannel integration – delivering seamless and unified experiences across multiple digital channels; (3) 24/7 accessibility – enabling customers to access services anytime and anywhere; (4) Interactivity – allowing direct engagement through applications, chatbots, and other interactive tools; (5) Security and

privacy – ensuring customer trust by safeguarding data and privacy in digital environments. Bolton et al. (2018) further assert that a central challenge in building customer experience lies in integrating digital, physical, and social realms into a cohesive experiential ecosystem.

In the context of e-commerce, DCX for young consumers encompasses all aspects of the customer journey, beginning with product discovery, continuing through purchase, and extending to post-purchase services, all of which take place in an online environment. Core components of DCX in e-commerce include: (1) User experience – website/app design and site performance; (2) Personalization – (3) Personalized recommendations and tailored experiences; (4) Secure and convenient payment – diverse payment methods and transaction security; (5) Communication and service support – 24/7 assistance and clear product information; (6) Omnichannel experience – cross-platform integration; (7) Logistics performance – delivery speed and accuracy.

Antecedents
Online Flow State
Customer experience can be achieved when users feel fully immersed in the use of a digital service application, without experiencing pressure or distractions. According to several scholars (Ertemel et al., 2021; Lestari et al, 2023; Nurahmasari et al., 2023), the online flow state is defined as "a totally absorbing, fully engaging online experience, described as a multidimensional construct encompassing a sense of control, intrinsic enjoyment, and time distortion."

In digital environments, the emergence of flow is shaped by several interrelated conditions that structure how users experience interaction with a platform. First, flow is more likely to occur when there is an appropriate balance between the challenges presented by the system and the user's capabilities. When digital interfaces are designed in a way that matches users' skills, neither overly complex nor overly simplistic, interaction becomes manageable and cognitively absorbing. Second, clarity of goals and the availability of immediate feedback play a central role. Users need to understand what actions are required at each stage of their journey, and system responses, such as confirmations, progress indicators, or adaptive prompts, help sustain orientation and continuity.

Another important element concerns the continuity of engagement. Digital interruptions, excessive distractions, or technical instability can disrupt concentration and reduce the likelihood of sustained involvement. A stable and coherent interaction environment enables users to remain focused on their activities. Finally, flow is closely associated with intrinsic satisfaction. When users experience enjoyment during interaction, the activity itself becomes rewarding, independent of external incentives.

Within the context of DCX, these conditions contribute to deeper involvement with the platform. Users who experience flow are more likely to spend extended time exploring features, navigating content, and engaging in transactions. Such immersive engagement increases the probability of meaningful interaction outcomes, including purchases, content sharing, and continued platform usage.

Co-Creation Value
This theory was initially developed by Prahalad and Ramaswamy (2004) and later expanded by Vargo and Lusch (2017). The core concept of value co-creation is the joint creation of value. Co-creation occurs when companies and consumers interact in the value-creation process. Such interactions generate experiences and can take various forms of collaboration, including user experience contributions, social media

engagement, and participation in communities. Through these interactions, companies can gather innovative ideas. Findings by Ahmad et al. (2022) indicate that co-creation value strengthens the formation of DCX. Co-creation also enhances participation in the process (Auh et al., 2007). According to Vargo and Lusch (2017), value co-creation improves business performance through several key mechanisms: consumer-driven innovation, increased customer loyalty, personalization, and competitive advantage.

Consequences
Customer Loyalty
Customer loyalty refers to a consumer's favorable attitude toward a service that is manifested in a strong commitment to repurchase in the future, leading to behavioral outcomes such as repeat purchases, customer retention, and positive word-of-mouth. Empirical studies confirm that service quality and customer satisfaction significantly influence loyalty intentions and long-term relational outcomes (Singh et al., 2023). Understanding and optimizing DCX enables c-commerce platforms to attract, retain, and enhance customer loyalty.

Customer loyalty can be achieved when digital experiences are satisfying and foster an emotional bond between customers and the brand. Among younger generations, loyalty is often driven by convenience, security, and the ability to perform transactions easily, anywhere and anytime. Positive DCX leads to repeat purchases, brand advocacy, and long-term engagement. By focusing on seamless, engaging, and personalized customer experiences, companies can build lasting loyalty and advocacy (Mahribi, 2020).

Customer loyalty is particularly important among young consumers because they have high expectations for the digital experiences they receive. Loyalty in e-commerce is influenced by the extent to which consumers choose to continue shopping on a specific platform or brand following positive experiences. Young consumers are highly digitally connected and have elevated expectations of online shopping. They tend to shift preferences quickly when dissatisfied or when the expected value is not met.

Therefore, building loyalty among young consumers in e-commerce requires adaptive and technology-driven strategies. Factors influencing young consumers' loyalty in e-commerce include: (1) Satisfying user experience (speed and ease of use), (2) Personalization, (3) Competitive pricing and discounts, (4) Social interaction, (5) Online–offline integration, and (6) Omnichannel experience.

Hypotheses Development
Based on the conceptual and theoretical explanations presented in the antecedent stage (online flow state and value co-creation) and the consequence stage (DCX and customer loyalty), the following hypotheses are proposed:

H1: Online flow state has a significant effect on value co-creation.
H2: Value co-creation has a significant effect on DCX.
H3: DCX has a significant effect on customer loyalty.
H4: Online flow state has a significant effect on customer loyalty.
H5: Online flow state has a significant effect on customer loyalty through value co-creation and DCX.
H6: Value co-creation has a significant effect on customer loyalty through DCX.
H7: Online flow state has a significant effect on DCX through value co-creation.

Integrated Conceptual Model
The integrated conceptual model in the context of e-commerce employs comprehensive theories and concepts to identify the antecedents and consequences of DCX. The

integration of models using a sample of young consumers aims to determine the extent to which loyalty can be sustained or enhanced. This research is crucial for understanding the factors that influence customer experience and how these experiences contribute to customer loyalty, particularly by emphasizing interaction-driven mechanisms.

To effectively foster loyalty, DCX must be strengthened through value co-creation, supported by conditions that facilitate an optimal online flow experience. Together, these mechanisms create a holistic framework that explains how digital interactions translate into meaningful experiences and long-term loyalty among young e-commerce consumers.

Figure 1. Integrated Conceptual Model
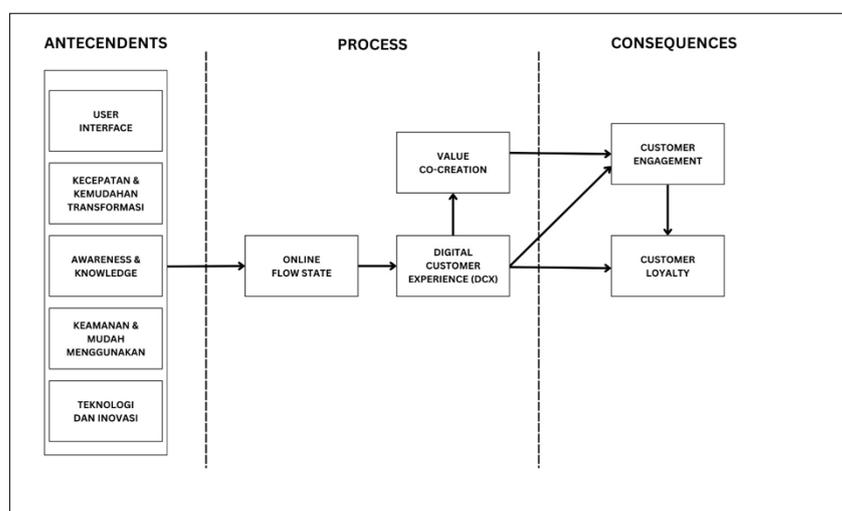
Figure 1 illustrates a conceptual framework consisting of three main components: antecedents, process, and consequences, which explain how DCX is formed and how it influences customer outcomes. The antecedents include user interface, transaction speed and convenience, awareness and knowledge, security and ease of use, as well as technology and innovation. These factors represent key digital attributes that shape customers' initial perceptions when interacting with a platform. In the process stage, these antecedents influence the online flow state, referring to the level of immersion and engagement experienced by users during online interactions. The online flow state subsequently contributes to the formation of DCX. In addition, DCX is linked to value co-creation, indicating that meaningful digital interactions enable both customers and firms to collaboratively create value. In the consequences stage, DCX and value co-creation lead to customer engagement and customer loyalty. DCX not only directly affects loyalty but also indirectly influences it through engagement, suggesting that a positive digital experience strengthens customer involvement and long-term commitment to the platform.

RESEARCH METHOD

This study employed a quantitative research method. The research population consisted of young consumers residing in Jakarta, Bogor, Depok, Bekasi, and Tangerang who actively use e-commerce platforms. The sample was selected using a non-random purposive sampling technique. The survey was administered via Google Forms from June to August 2025. A total of 182 valid responses were collected, which is considered an adequate sample size for structural equation modelling. According to Hair et al.

(2019), the minimum recommended sample size for quantitative research ranges from 30 to 100 respondents.

The measurement items for the Online Flow State variable were adapted from multiple sources (Agarwal & Karahanna, 2000; McKnight & Chervany, 2001). Items for DCX were adapted from Silalahi & Rufaidah (2017). Measurement items for Value Co-Creation were adapted from Auh et al. (2007), Prahalad & Ramaswamy (2004), and Vargo & Lusch (2017). Items measuring Customer Loyalty were adapted from Verhoef et al. (2021).

All constructs were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), followed by descriptive statistical analysis to examine the mean and standard deviation. Hypotheses were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for analyzing complex relationships among latent constructs (Astawan et al., 2025). SmartPLS 4.0 software was utilized to assess both the measurement and structural models and to test the proposed hypotheses.

RESULTS

Respondents Profile
Table 1. Respondents Profile

Demographics	Frequency (n = 182)	Percentage (%)
E-Commerce Platforms Used		
Blibli	6	3.3
Lazada	6	3.3
TikTok Shop	19	10.4
Shopee	111	61.0
Tokopedia	24	13.2
Others (Sociolla, Zalora, Bukalapak)	16	8.8
Age		
17–25 years	137	75.3
26–35 years	42	23.1
36–45 years	3	1.6
Gender		
Male	67	36.8
Female	115	63.2
Occupation		
Student	109	59.9
Private Employee	46	25.3
Civil Servant (ASN)	9	4.9
State-Owned Enterprise Employee	5	2.7
Entrepreneur	10	5.5
Others	3	1.6
Education		
Junior High School	1	0.5
Senior High School	101	55.5
Diploma	12	6.6
Bachelor's Degree (S1)	66	36.3
Master/Doctoral Degree (S2–S3)	2	1.1
Monthly Expenditure		
0–1 million IDR	57	31.3
1–3 million IDR	47	25.8

3–5 million IDR	44	24.2
>5 million IDR	34	18.7

Table 1 provides a comprehensive demographic overview of the 182 participants involved in this study on DCX in e-commerce services. The majority of respondents (61.0%) primarily used Shopee, followed by Tokopedia (13.2%) and TikTok Shop (10.4%), indicating the dominant position of these platforms among e-commerce users. Other platforms, such as Lazada, Blibli, and several niche providers, accounted for smaller proportions of usage. In terms of age distribution, the sample was largely concentrated within younger cohorts, with 75.3% of respondents aged 17–25 years and 23.1% aged 26–35 years. Only a small fraction (1.6%) fell within the 36–45-year age group, suggesting that the study predominantly reflects the perspectives of young e-commerce users. Gender distribution indicates that women constituted the majority of respondents (63.2%), while men accounted for 36.8%. This pattern may imply that women are either more active users of e-commerce services or more represented in voluntary survey participation.

The largest group of respondents comprised students (59.9%), consistent with the dominance of the younger demographic. This was followed by private sector employees (25.3%), entrepreneurs (5.5%), state-owned enterprise employees (2.7%), and civil servants (4.9%). The "Others" category represented 1.6% of the sample. Educational attainment varied widely, although the majority reported senior high school education (55.5%) and bachelor's degrees (36.3%). Smaller proportions held junior high school education (0.5%), diploma-level qualifications (6.6%), or postgraduate degrees (S2–S3) (1.1%).

Monthly e-commerce expenditure also varied considerably. Most respondents (31.3%) reported spending between IDR 0 and IDR 1 million per month. Substantial proportions spent between IDR 1–3 million (25.8%) and IDR 3–5 million (24.2%), while 18.7% reported monthly expenditures exceeding IDR 5 million, indicating diverse levels of purchasing power among e-commerce users. In general, the respondent profile demonstrates that this study captures the perceptions and DCX of a predominantly young population segment, characterized by a high proportion of students, female users, active Shopee shoppers, and a wide range of monthly expenditure levels.

Descriptive Statistics, Validity, and Reliability Results
Table 2. Descriptive Statistics, Validity, and Reliability Results

No	Item	Loading Factor	Mean	SD	Cronbach's Alpha	CR	AVE
Online Flow State							
1	I enjoy the process of browsing products on this e-commerce site.	0.824	0.820	0.036	0.933	0.944	0.653
2	I can complete transactions on this e-commerce platform without being distracted by other things.	0.775	0.771	0.044			
3	I feel that the system and interface of the application support my thinking and actions while making	0.830	0.826	0.031			

	transactions on this e-commerce platform.						
4	All the features I need in this e-commerce application are easily accessible without causing me to lose concentration.	0.790	0.785	0.038			
5	Using this e-commerce service provides an impressive experience.	0.836	0.831	0.031			
6	The navigation and features in this e-commerce site make it easy for me to engage in the shopping process.	0.764	0.759	0.047			
7	I enjoy the process of searching for and selecting products on this e-commerce site.	0.840	0.837	0.030			
8	I feel the desire to keep browsing this e-commerce site even when I do not intend to make an immediate purchase.	0.813	0.808	0.039			
9	Shopping on this e-commerce platform provides a pleasant and satisfying experience.	0.796	0.792	0.041			
Value Co-Creation							
1	This e-commerce platform provides features or tools that allow me to provide feedback on products and services.	0.733	0.727	0.057			
2	I believe that my participation in this e-commerce platform helps enhance my overall shopping experience.	0.786	0.782	0.040	0.911	0.928	0.618
3	This e-commerce platform gives me opportunities to participate in programs or activities that support value co-creation.	0.833	0.831	0.032			

4	I feel that the collaboration between myself as a customer and this e-commerce platform helps improve the quality of the products offered.	0.782	0.778	0.041			
5	The shopping experience on this e-commerce platform feels personalized based on my contributions as a customer.	0.786	0.781	0.044			
6	I frequently share ideas or suggestions that help this e-commerce platform improve its service quality.	0.779	0.779	0.028			
7	This e-commerce platform often asks for my opinions on the shopping experience or products I purchase.	0.764	0.759	0.044			
8	Overall, I feel involved in the value creation process when shopping on this e-commerce platform.	0.821	0.820	0.032			
Digital Customer Experience (DCX)							
1	Navigation on this e-commerce website/platform is easy to perform.	0.759	0.756	0.041			
2	The design of this e-commerce website/platform is visually appealing and pleasant.	0.792	0.788	0.036			
3	This e-commerce platform provides a consistent experience across both desktop and mobile devices.	0.775	0.773	0.041	0.930	0.941	0.614
4	The product search feature on this platform delivers results relevant to my needs.	0.772	0.770	0.046			
5	This e-commerce platform offers good	0.807	0.803	0.037			

	personalization based on my preferences.						
6	The checkout or payment process on this platform is simple and not confusing.	0.672	0.666	0.065			
7	I feel that this e-commerce platform provides sufficient information to make a purchase decision.	0.817	0.816	0.030			
8	I feel comfortable interacting with customer support or online chat services on this platform.	0.805	0.801	0.035			
9	The product search process on this e-commerce platform is fast and efficient.	0.792	0.790	0.039			
10	The shopping experience on this e-commerce platform makes me feel valued as a customer.	0.837	0.834	0.032			
Customer Loyalty							
1	This e-commerce platform consistently meets my expectations regarding product quality.	0.753	0.753	0.046			
2	I feel that I receive good value for money when shopping on this platform.	0.788	0.786	0.038			
3	I am satisfied with my shopping experience on this e-commerce platform.	0.815	0.811	0.033	0.911	0.928	0.618
4	I will recommend this e-commerce platform to friends and family.	0.774	0.771	0.041			
5	I tend to purchase products more frequently from this platform compared with its competitors.	0.775	0.771	0.041			
6	Customer service on this e-commerce platform is very helpful and responsive.	0.769	0.768	0.040			
7	My purchasing experience on this	0.815	0.813	0.030			

	platform is better than on other platforms I have used.						
8	I will continue using this e-commerce platform for future purchases.	0.795	0.790	0.046			

Based on the analytical results presented in Table 2 using the SmartPLS application, all constructs in this study were found to meet the required criteria for validity and reliability. This is evidenced by the loading factor values of each indicator, which predominantly exceed the threshold of 0.70, indicating that the indicators demonstrate strong contributions in representing their respective latent constructs. Furthermore, the Average Variance Extracted (AVE) values for all constructs are above the minimum acceptable level of 0.50, suggesting that the constructs are able to explain more than half of the variance of their measurement indicators.

In terms of reliability, all constructs also exhibit highly satisfactory outcomes. The Cronbach's Alpha values range from 0.911 to 0.933, while the Composite Reliability (CR) values fall between 0.928 and 0.944. Both measures substantially surpass the recommended minimum threshold of 0.70, indicating a strong level of internal consistency among the items within each construct. Overall, these findings confirm that the measurement instruments employed in this study are both reliable and valid, thereby supporting their use for subsequent analyses, including the examination of relationships among constructs within the structural model.

Discriminant Validity (Cross Loading)
Table 3. Discriminant Validity (Cross Loading)

Indicator	Customer Loyalty	DCX	Online FLow State	Value Co-Creation
CL1	0.753	0.737	0.687	0.645
CL2	0.788	0.748	0.708	0.698
CL3	0.815	0.774	0.769	0.715
CL4	0.774	0.733	0.725	0.719
CL5	0.775	0.750	0.703	0.728
CL6	0.769	0.705	0.678	0.716
CL7	0.815	0.744	0.733	0.709
CL8	0.795	0.732	0.744	0.696
DC1	0.712	0.759	0.665	0.627
DC2	0.768	0.792	0.736	0.715
DC3	0.716	0.775	0.653	0.720
DC4	0.713	0.772	0.673	0.672
DC5	0.780	0.807	0.755	0.739
DC6	0.654	0.672	0.607	0.614
DC7	0.754	0.817	0.758	0.672
DC8	0.753	0.805	0.728	0.685
DC9	0.748	0.792	0.702	0.662
DC10	0.783	0.837	0.769	0.729
OF1	0.746	0.749	0.824	0.638
OF2	0.723	0.709	0.775	0.616
OF3	0.714	0.712	0.830	0.606
OF4	0.724	0.723	0.790	0.583
OF5	0.787	0.756	0.836	0.651

OF6	0.714	0.709	0.764	0.568
OF7	0.794	0.767	0.840	0.678
OF8	0.721	0.723	0.813	0.592
OF9	0.722	0.699	0.796	0.585
VC1	0.696	0.692	0.580	0.733
VC2	0.717	0.683	0.645	0.786
VC3	0.750	0.712	0.647	0.833
VC4	0.673	0.639	0.555	0.782
VC5	0.699	0.693	0.607	0.786
VC6	0.638	0.632	0.502	0.779
VC7	0.691	0.718	0.597	0.764
VC8	0.751	0.713	0.627	0.821

Based on Table 3, which presents the results of the discriminant validity assessment through cross-loading analysis, it can be concluded that each indicator exhibits the highest loading value on its intended construct compared to other constructs. This pattern indicates that the indicators are able to clearly distinguish one construct from another. For instance, indicator DC10 demonstrates the highest loading value of 0.837 on the Digital Customer Loyalty construct, exceeding its loadings on all other constructs. Similar trends are observed across the remaining indicators, where the loading values on their primary constructs consistently surpass those on alternative constructs. This phenomenon provides evidence that each construct is measured by specific, non-overlapping indicators, thereby confirming that discriminant validity has been achieved.

Accordingly, the measurement model in this study demonstrates satisfactory discriminant validity. Each indicator effectively measures its corresponding construct without substantial overlap with other constructs. These results reinforce that the measurement instrument is appropriately structured and suitable for subsequent structural analysis within the PLS-SEM framework.

Hypothesis Testing
Direct Effect
Table 4. Hypothesis Testing Direct Effect

	Hypothesis	Original Sample (O)	t-statistics	p-value	Conclusion
H1	Online Flow State → Value Co-Creation	0.760	7.543	0.000	Accepted
H2	Value Co-Creation → DCX	0.874	18.412	0.000	Accepted
H3	DCX → Customer Loyalty	0.630	7.211	0.000	Accepted
H4	Online Flow State → Customer Loyalty	0.347	4.082	0.000	Accepted

Table 4 presents the results of four primary hypotheses that assess the direct relationships among the variables. Consistently, all hypotheses (H1, H2, H3, and H4) yield p-values of 0.000, which fall substantially below the 0.05 significance threshold, thereby supporting the acceptance of all proposed hypotheses. These results indicate the presence of statistically significant direct effects among all hypothesized relationships.

H1 reveals that online flow state positively and strongly influences value co-creation, as evidenced by a path coefficient of 0.760 and a high t-statistic of 7.543. This finding suggests that when users experience a heightened state of online 'flow,' they are more likely to participate actively in co-creating value. Subsequently, H2 demonstrates that value co-creation exerts a notably strong and positive effect on DCX, reflected by the

highest path coefficient (0.874) and a t-statistic of 18.412. This underscores that customer participation in value co-creation substantially enhances their digital experience.

Furthermore, H3 confirms that DCX significantly and positively affects customer loyalty, with a path coefficient of 0.630 and a t-statistic of 7.211, emphasizing that a positive digital experience is a key determinant of customer loyalty. H4 further shows that online flow state has a positive and significant direct effect on customer loyalty, with a path coefficient of 0.347 and a t-statistic of 4.082, although its magnitude is comparatively more moderate than the other relationships examined.

The direct hypothesis testing provides strong empirical evidence that the online flow experience plays a crucial role in shaping both value co-creation and customer loyalty. Moreover, an enhanced DCX strengthened through value co-creation serves as an essential mechanism for fostering customer loyalty.

Indirect Effect
Table 5. Hypothesis Testing Indirect Effect

	Hypothesis	Original Sample (O)	t-statistics	p-value	Conclusion
H5	Online Flow State → Value Co-Creation → DCX → Customer Loyalty	0.418	5.447	0.000	Accepted
H6	Value Co-Creation → DCX → Customer Loyalty	0.550	7.389	0.000	Accepted
H7	Online Flow State → Value Co-Creation → DCX	0.664	5.577	0.000	Accepted

Table 5 presents the results of the hypothesis testing for the indirect (mediated) effects among the variables in the research model. In contrast to the direct effects previously discussed, the indirect effects examine how one variable influences another through one or more mediating variables. The findings indicate that all three proposed mediation hypotheses (H5, H6, and H7) are supported, as evidenced by consistent p-values of 0.000 for each hypothesis. These p-values are far below the 5% significance threshold, indicating that all hypothesized indirect effects are statistically significant. The "Original Sample (O)" column in the table represents the indirect effect coefficients, reflecting both the magnitude and direction of the mediation effects, while the "t-statistics" values indicate the statistical significance of these indirect pathways.

H5 evaluates the indirect effect of online flow state on customer loyalty through two sequential mediators, they are value co-creation and DCX. The results confirm the presence of a significant dual mediation effect. The indirect effect coefficient of 0.418, supported by a robust t-statistic of 5.447 and a p-value of 0.000, demonstrates that the experience of online flow initially promotes customer engagement in value co-creation.

H6 examines the indirect effect of value co-creation on customer loyalty mediated by DCX. With an indirect effect coefficient of 0.550 and a notably high t-statistic of 7.389, the results provide strong evidence of a significant mediation effect.

The final hypothesis (H7) assesses the indirect effect of online flow state on DCX mediated by value co-creation. The indirect effect coefficient of 0.664, supported by a strong t-statistic of 5.577, indicates a significant mediation effect. This suggests that when users experience a state of flow during online interactions, it substantially

encourages their engagement in value co-creation, which in turn contributes to enhancing their overall DCX.

R-Square Test
Table 6. R-Square Test

Variable	R Square	R Square Adjusted
Value Co-Creation	0.578	0.575
DCX	0.763	0.762
Customer Loyalty	0.911	0.910

Based on Table 6, the R-Square value of 0.578 indicates that 57.8% of the variance in the value co-creation can be explained by online flow state, which serves as its primary predictor based on the preceding analysis. The slightly lower Adjusted R-Square value of 0.575 (57.5%) further confirms the model's strong explanatory capability for value co-creation. This proportion is considerably high, demonstrating that the model possesses substantial predictive power in explaining how value co-creation is formed. In other words, the factors examined in this study are highly effective in elucidating why customers engage in co-creating value.

The R Square value for DCX is notably high at 0.763, indicating that 76.3% of its variance is explained by the model's predictors, namely value co-creation and online flow state. The Adjusted R Square value of 0.762 (76.2%), which is nearly identical, further reinforces the model's strong explanatory strength. These results demonstrate that the model is highly effective in predicting or explaining variations in DCX, suggesting that value co-creation and online flow state are powerful determinants of DCX.

For customer loyalty, the R Square value is 0.911, indicating that 91.1% of the variance in customer loyalty can be explained by the predictors in the model (i.e., online flow state and DCX, as well as indirectly through value co-creation). This represents an exceptionally high level of predictive accuracy, approaching near-complete explanation. The Adjusted R Square value, also remarkably high at 0.910 (91.0%), confirms the model's excellent explanatory power even after adjusting for the number of predictors. The minimal difference between the R Square and Adjusted R Square values further indicates that the model is highly robust and possesses strong generalizability.

In the context of e-commerce, the online flow state triggers consumers' experiences when conducting online transactions, which are further strengthened through value creation as a mediating factor. Therefore, value creation becomes a key factor in strengthening or weakening the DCX. The development of e-commerce, which is largely driven by digital transformation, is highly influenced by the ability of businesses to provide personalized or customized experiences, leading to repeat purchases that ultimately enhance customer loyalty. However, maintaining loyal customers in the e-commerce industry is challenging and requires strategic efforts to deliver enjoyable and meaningful customer experiences.

Figure 2 illustrates the overall structural framework of the study..

Figure 2. Structural Model
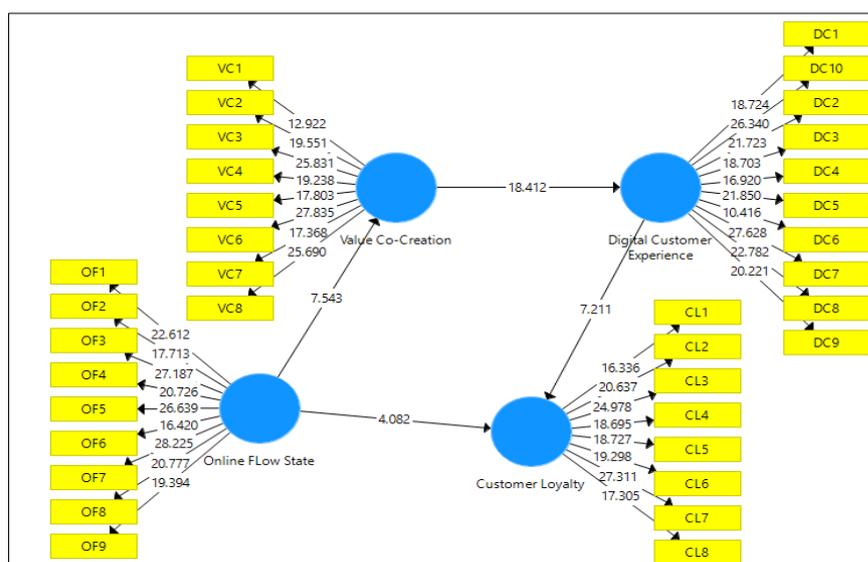
DISCUSSION

Analysis of the Findings

The Effect of Online Flow State on Value Co-Creation (H1)

The findings confirm that online flow state has a significant positive effect on value co-creation. When young consumers experience immersive and uninterrupted digital interactions, they are more inclined to engage in participatory behaviors that contribute to value formation. In line with Flow Theory (Csikszentmihalyi, 2000), heightened absorption enhances attentional focus and reduces cognitive distraction, thereby encouraging proactive engagement. This result is consistent with prior empirical findings (Ertemel et al., 2021; Hoang & Khoa, 2022), which demonstrate that experiential immersion strengthens interactive behaviors in digital environments. Moreover, Ariansyah et al. (2021) emphasize that user knowledge reduces cognitive barriers to participation, reinforcing the idea that psychological immersion precedes active collaboration. These findings suggest that value co-creation does not emerge spontaneously; rather, it is stimulated by experiential conditions that facilitate engagement readiness.

The Effect of Value Co-Creation on DCX (H2)

The results indicate that value co-creation exerts the strongest influence within the structural model, significantly enhancing DCX. The magnitude of this relationship suggests that participatory engagement plays a central role in shaping digital experience evaluations. When customers perceive that their input contributes to personalization, service refinement, or interaction quality, their overall assessment of the platform becomes more favorable. This aligns with previous research highlighting the relationship between co-creation and enhanced online experience quality (Bilgihan et al., 2014; Ertemel et al., 2021). Additionally, Amini et al. (2025) and Arinta & Widyastuti (2024) suggest that participatory processes reinforce experiential perceptions over time. The strength of this path implies that experiential quality in e-commerce is not solely determined by functional design, but is significantly shaped by interactive involvement.

The Effect of DCX on Customer Loyalty (H3)

The findings demonstrate that DCX has a strong positive effect on customer loyalty, confirming its role as a primary determinant of sustained behavioral commitment. Digital experiences characterized by usability, personalization, responsiveness, and relevance significantly influence customers' intentions to revisit and maintain long-term

relationships. This finding supports prior literature emphasizing the centrality of customer experience in loyalty formation (Rahayu & Faulina, 2022; Silalahi & Rufaidah, 2018). In highly competitive digital markets, experiential evaluation becomes a critical basis for differentiation. The strength of this relationship reinforces DCX as a structural bridge between engagement processes and loyalty outcomes.

The Direct Effect of Online Flow State on Customer Loyalty (H4)
In addition to indirect pathways, online flow state also directly influences customer loyalty, although the magnitude of this effect is comparatively moderate relative to the effect of DCX. This indicates that immersive interaction can independently foster positive affective responses toward the platform. Consistent with Ertemel et al. (2021) and technology acceptance research (Venkatesh et al., 2003; Venkatesh et al., 2012), emotionally engaging digital interactions contribute to favorable attitudinal outcomes. However, the relatively smaller coefficient suggests that flow alone is insufficient to sustain loyalty unless it translates into broader experiential and participatory benefits.

Sequential Mediation of Value Co-Creation and DCX (H5)
The findings confirm a significant sequential mediation mechanism, whereby online flow enhances value co-creation, which subsequently strengthens DCX and ultimately increases customer loyalty. This layered pathway clarifies the process through which psychological immersion evolves into behavioral commitment. Rather than operating as an isolated experiential state, flow initiates participatory engagement, which then improves experiential evaluation before influencing loyalty. This sequential explanation addresses conceptual fragmentation in prior research and provides a more comprehensive understanding of loyalty formation in digital commerce contexts.

The Mediating Role of DCX (H6)
The results further demonstrate that value co-creation influences loyalty through DCX. This indicates that participatory engagement contributes to loyalty primarily when it enhances perceived experience quality. Co-creation activities that fail to translate into improved digital experiences may not effectively generate sustained loyalty. Thus, DCX functions as a critical evaluative mechanism that transforms collaborative interaction into relational commitment.

The Mediating Role of Value Co-Creation (H7)
The analysis confirms that value co-creation mediates the relationship between online flow and DCX. Immersive interaction stimulates active participation, which subsequently enhances experiential evaluation. This finding clarifies the transition from psychological immersion to holistic digital assessment, offering empirical support for integrating Flow Theory with Value Co-Creation Theory in explaining DCX formation.

Theoretical and Managerial Implications
The findings collectively support the perspective of Verhoef et al. (2021), who argue that digital loyalty emerges from consistent, personalized, and interactive experiences. Within the proposed framework, online flow operates as the psychological trigger, value co-creation functions as the participatory mechanism, and DCX represents the evaluative outcome that ultimately influences loyalty. The high explanatory power of the model indicates that loyalty in digital commerce is shaped by interconnected experiential and interactive processes rather than by isolated determinants.

From a managerial standpoint, these results suggest that firms should not rely solely on promotional intensity or technological functionality. Instead, strategic emphasis should be placed on designing interaction environments that facilitate immersive engagement, encourage meaningful participation, and translate collaborative input into perceptible

experiential improvement. By aligning psychological engagement with participatory structures and experiential quality, firms may enhance long-term loyalty in competitive digital markets.

CONCLUSION

This study examined the direct and indirect relationships among online flow state, value co-creation, DCX, and customer loyalty within the e-commerce context. The findings confirm that online flow state significantly influences customer loyalty both directly and indirectly through value co-creation and DCX. However, DCX emerges as the strongest direct predictor of customer loyalty, reinforcing its central role in translating experiential and participatory processes into sustained relational outcomes.

The results further demonstrate a significant sequential mediation mechanism, in which online flow state enhances value co-creation, strengthens DCX, and ultimately contributes to customer loyalty. The model explains a substantial proportion of variance in customer loyalty, indicating strong explanatory power. These findings suggest that immersive digital experiences do not operate in isolation but function through participatory engagement and experiential evaluation processes.

Theoretically, this study advances Flow Theory by positioning it within a broader structural framework that incorporates Value Co-Creation Theory and DCX. By empirically validating both direct and sequential mediation pathways, this research contributes to the customer experience literature through a more integrated explanation of how experiential states evolve into loyalty behavior.

From a managerial perspective, the findings emphasize the importance of designing digital environments that balance usability and engagement, facilitate active participation, and consistently deliver high-quality digital experiences across touchpoints. Strengthening interactive mechanisms and personalization features is particularly relevant for sustaining loyalty among younger consumers. Future research may extend this model across different cultural settings, platform types, and product categories, while incorporating longitudinal designs and potential moderating variables such as age or digital proficiency.

LIMITATION
This study is subject to several limitations. The cross-sectional design restricts causal interpretation of the observed relationships. The reliance on self-reported data may introduce common method bias, and the sample characteristics, focused on a specific demographic and geographic context, may limit generalizability. Although the model demonstrates high explanatory power, future studies employing longitudinal designs, multi-source data, or cross-cultural comparisons would strengthen the external validity and causal inference of the findings.

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ABOUT THE AUTHOR(S)

1st Author
Zulfahmi, S.E., M.E. is a lecturer in the Development Economics Program at Universitas Terbuka, Indonesia, where he also serves as the Head of the Development Economics Study Program. He holds a Master of Economics degree with a specialization in development economics and public policy. His research interests include regional and local economic development, public sector economics, poverty and welfare analysis, sustainable development, and economic policy evaluation. He has been actively involved in academic research, community development programs, and scholarly publications related to strategic issues in Indonesia's economic development.

2nd Author
Hubertina Karolina Ngarbingan, S.Pd., M.Par., is a lecturer at Universitas Terbuka, Indonesia. She earned her Master of Tourism degree and specializes in tourist behavior, cultural tourism, and tourism management. Her academic works focus on traveler decision-making, destination culture, and contemporary issues in tourism studies.
Email: hubertinacarol@gmail.com
ORCID ID: https://orcid.org/0009-0000-1549-729X

3rd Author
Prof. Dr. Ginta Ginting, M.B.A., is a professor and senior lecturer at Universitas Terbuka, Indonesia. She obtained his doctoral degree in management and an MBA with a concentration in business strategy. Her scholarly interests encompass management, tourism, and organizational studies. She has published extensively in national and international journals and has contributed significantly to research advancements in management and tourism education.
ORCID ID: https://orcid.org/0000-0002-5139-6370

4th Author
Maya Maria, S.E., M.M is a management lecturer at Universitas Terbuka and currently serves as the Head of the Entrepreneurship Study Program. Her academic interests include organizational management, economic development, and applied research related to managerial practice, with an active commitment to publishing studies in the fields of management and economics.
ORCID ID: https://orcid.org/0000-0002-9669-4259