

A Study on the Mechanism of User Co-Creation on LEGO Brand Loyalty: The Moderating Role of Mind-Flow Experience and the Mediating Role of Community Affiliation

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Abstract: Taking LEGO brand as a case study, this study constructs a chain model of “user value co-creation→community belonging→brand loyalty” based on the value co-creation theory, the mind-flow theory and the brand community theory, and explores the moderating role of the mind-flow experience in it. We collected questionnaire data from LEGO’s core user group (N=310), and used structural equation modeling (SEM) and Bootstrap method to conduct empirical tests. The study found that: value co-creation significantly and positively affects brand loyalty, indicating that users’ participation in product design, content generation and other co-creation behaviors directly strengthens brand identity and repeat purchase intention; community belongingness plays a partially mediating role, revealing that users’ sense of belonging to LEGO’s fan community is strengthened through co-creation behaviors, which is then transformed into brand loyalty; mind-flow experience has a significant effect on the above paths; heart-flow experience has a significant effect on the above paths. The co-creation behavior of the users’ community of LEGO fans enhances their sense of belonging to the community, which is then transformed into brand loyalty. This study is the first to integrate the multi-stage mechanism of “behavior-emotion-loyalty” in a physical product scene, verifying the gain effect of mind-flow experience on value co-creation, and expanding the boundaries of the application of the theory of consumer engagement. In practice, companies such as LEGO are suggested to systematically enhance user loyalty through step-by-step task design (to stimulate heart flow), community belonging cultivation (e.g., offline fan festivals), and open co-creation platforms (e.g., LEGO Ideas). This study provides a theoretical basis and operational framework for user operations of high-engagement brands.

Keywords: User Value Co-creation; Heart Flow Experience; Brand Community Belonging; Brand Loyalty; Consumer Psychology

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1.Introduction

At a time when Web 4.0 and experience economy are intertwined, the role of consumers has evolved from passive receivers to value co-creators^[1]. Brands empower users to participate in product design, content production and even marketing communication through open innovation platforms, forming a unique “co-creation-symbiosis” relationship. LEGO, as a model of global user co-creation, has received tens of thousands of user design proposals on its LEGO Ideas platform, which has directly driven the revenue growth of related products. This phenomenon reveals that user co-creation is reconfiguring the

logic of brand loyalty generation - the traditional loyalty driving mechanism centered on product quality or price is gradually giving way to the deep psychological connection of emotional immersion and social recognition.

However, there is a significant paradox in corporate practice: although most multinational companies have already laid out user co-creation, only a small number of them have been able to effectively transform it into long-term loyalty. For example, LEGO's competitor Mattel's "Design by Me" program has a retention rate of less than 1/3 of LEGO's similar platforms due to a lack of community interaction and immediate feedback, suggesting that technology alone is not enough to activate loyalty behaviors, and that in-depth analysis of the psychological mechanisms of the user is needed. It is necessary to deeply analyze the psychological mechanism of users.

Based on the above background, this study will investigate the impact of user co-creation on LEGO brand loyalty and focus on testing the mediating effects of mindstream experience and community belonging in this process.

2. Preliminaries

2.1 User value co-creation and brand loyalty

Value Co-Creation Theory (VCT) advocates that value is not created unilaterally by the enterprise, but by the enterprise, consumers and other stakeholders through interaction. The core of the theory breaks through the traditional "enterprise-centered theory" and emphasizes that consumers are transformed from passive recipients to active participants, and that they collaborate with enterprises to create value in research and development, design, consumption and other aspects. In the 19th century, service economics proposed that "production and consumption need to cooperate", and in the 20th century, the consumer production theory was further expanded to consider that consumers participate in value creation through knowledge and skills. In the beginning of the 21st century, Schneider, P.A (2005) suggested that in order to improve customer satisfaction, value should be co-created by consumers and consumers should be involved in the design stage of products/services^[2]. Through empirical analysis, Jia Shuainan (2024) concluded that the practice of value co-creation is an important foundation for the formation of brand loyalty, i.e., high-quality value co-creation behaviors can have a positive impact on consumer brand loyalty^[3]. For example, LEGO through the LEGO Ideas platform to build an open ecology of co-creation, users can submit creative designs and participate in the voting, the excellent works of eventual commercialization, this "participatory design" to give the user "This kind of "participatory design" gives users the identity of "creators" and stimulates their sense of belonging and responsibility, which may directly enhance the recognition and loyalty to the brand. Therefore, this study proposes the hypothesis

H1: User value co-creation influences brand loyalty.

2.2 User value co-creation, mindstream experience and brand loyalty

The concept of mindstream experience was first proposed by psychologist Csikszentmihalyi (1975), who emphasized that when individuals are attracted by the activities they are engaged in, they will forget about the passage of time and not be affected by the things around them, and they will be fully immersed in the current affairs, and enter a kind of mindstream state. According to Xu Jianing (2023), the mindstream experience is widely used in online environments, where consumers are able to generate pleasurable positive emotions in the state of mindstream, which are externalized into user's will and behaviors through the mechanism of psychological transformation^[4]. User behavior is further manifested as an autonomous expectation to co-create value with merchants, and empirical analysis confirms that the mind-flow experience can promote consumers' willingness to co-create value. Guo Shu (2024) in the field of tourism argued that the mindstream experience as a psychological state in which users feel happy and satisfied will stimulate value co-creation behaviors such as sharing and commenting, i.e., the mindstream experience has a positive impact on value co-creation^[5].

Therefore, this study proposes the following hypothesis:

H2: Heartstream experience plays a mediating role in the influence of users' value co-creation on brand loyalty.

2.3 User value co-creation, brand community belonging and brand loyalty

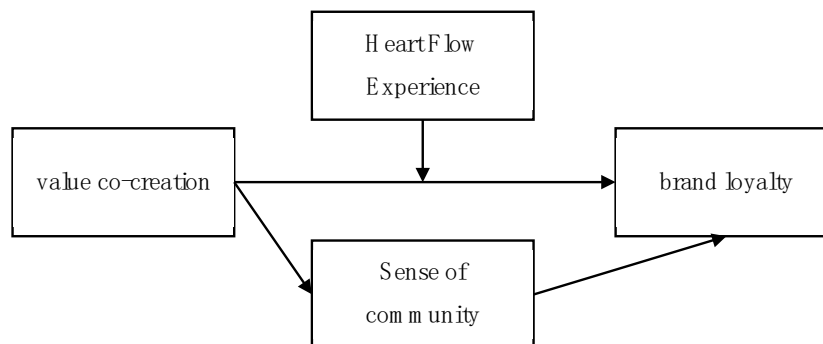
The concept of brand community was first proposed by Muniz and O'Guinn (2001), and defined it as a specialized community that breaks through geographic constraints based on a network of social relationships for co-branded consumption, where members are linked through a sense of sharing, ritual traditions and moral responsibility, and whose

core features are brand-centered, through social interactions (online or offline) The core features are brand-focused, through social interaction (online or offline), establishing member relationships and emphasizing identity and group belonging, for example, the Lululemon brand strengthens users' sense of belonging through the operation of yoga community to drive repurchase and word-of-mouth communication ^[6]. Scholars such as Algesheimer (2005) define brand community belonging as a state of psychological belonging formed by consumers in a brand community, which manifests itself as recognition of the identity of the community, emotional dependence and active participation behavior ^[7]. active participation behavior ^[7]. Through his research, Xu Mangmang found that the sense of belonging of virtual brand community members positively affects their brand loyalty, brand trust and brand commitment, i.e., the higher the sense of belonging of brand community members, the higher the loyalty to the brand ^[8]. According to Zhou Jianling (2020), users' participation in value co-creation (e.g., product feedback, content creation) significantly enhances brand cognitive preference and brand affective preference, i.e., the more a user participates in value co-creation actions, the higher the cognitive preference and affective preference for that brand ^[9]. Wu Si proposed that the behavior of user value co-creation, such as information exchange and social interaction, can significantly affect the user's willingness to publish and browse opinions through perceived ease of use and cognitive and emotional trust, i.e., it can add the user's understanding of the brand and, thus, generate cognitive and emotional preferences [10]. In the case of Xiaomi brand in China, we can see more that users through the Xiaomi online community user interaction (such as product improvement discussion, and get the recognition of Xiaomi company, according to the user's co-creation to improve the product) through the accumulation of trust, improve the community activity and the user's sense of belonging.

In summary, this study proposes the hypothesis,

H3: Community belonging plays a moderating role in the effect of user co-creation on brand loyalty

Fig 1. research model



3.The Proposed Scheme

3.1 Research Data

This study was conducted in April 2025 using the Chinese Internet questionnaire “Questionnaire Star”, targeting respondents who are interested in the topic of LEGO. 314 responses were collected. A total of 314 responses were collected, and after removing the 4 invalid samples that indicated they had no experience with LEGO, there were 310 valid samples remaining. 310 respondents were evenly balanced between males (150, 45.4%) and females (160, 51.6%). In terms of age, the largest number of respondents were aged 18-30 (125, 40.3%) and 31-45 (128, 41.3%). In terms of monthly income, \$3001-6000 was the most numerous, hitting 145 (46.8%). And the largest number of respondents indicated that they had recently followed LEGO-related content 2-5 times (149, 48.1%). The details are shown in Table 1.

Table 1. Demographics

		frequency	%	Effective percentage	Total percentage
genders	man	150	48.4	48.4	48.4
	women	160	51.6	51.6	100.0
age	18~30	125	40.3	40.3	40.3
	31~45	128	41.3	41.3	81.6
	46+	57	18.4	18.4	100.0

		frequency	%	Effective percentage	Total percentage
monthly salary	0-3000	67	21.6	21.6	21.6
	3001-6000	145	46.8	46.8	68.4
	6001-10000	68	21.9	21.9	90.3
	10000+	30	9.7	9.7	100.0
Number of Con- cerns	0-2	81	26.1	26.1	26.1
	2-5	149	48.1	48.1	74.2
	6-9	60	19.4	19.4	93.5
	10+	20	6.5	6.5	100.0

3.2 Operational Definition of Variables

The variables used in this study were reconstructed to suit the purpose of this study by reconstructing the criteria used in the previous study to suit the purpose of this study using a 5-point Likert scale (1 = Strongly Disagree, 3 = Moderately, and 5 = Strongly Agree), with the measurements for each of the components shown in Table 2 below.

Table 2. Variable definitions

Variable	Item	Source
User value co-creation	I would like to make suggestions for the development of LEGO's design etc. through online or offline platforms.	M.M. YAN. (2024) ^[11]
	I'll work with the LEGO design publisher.	
	I'll be responding to and helping other users with LEGO-related questions on all platforms.	
	I will post or participate in comments on various platforms to show my understanding of the staff's flawed service (poor service, etc.) due to certain reasons.	
	I will use various platforms to get the information I need to design Lego.	
	I will share my LEGO designs through various platforms, or encourage friends around me to participate in LEGO creation and share their experiences	
	I'll be watching for information on LEGO designs, ways to put LEGO together, etc. in various platforms.	
	I will respond to my needs through various platforms to LEGO staff, or publishers of information.	
Heart Flow Experience	I've been feeling suitably challenged by playing with Lego lately.	C.C. XU. (2023) ^[12]
	My mind/activity runs in a very flow and smooth way when I play with Lego lately.	
	I haven't noticed the passage of time while playing with Lego lately.	
	I haven't had trouble concentrating when playing with Lego lately.	
	Lately I've been playing with Lego's with my mind completely clear.	
	Lately when I play with Lego I'm completely focused on what I'm doing.	
	While playing with Lego lately I've been naturally having thoughts/actions about.	
	I know what to do every step of the way when I'm playing with Legos these days.	
	I was able to get the hang of it while playing with Lego recently.	
	I've been in deep thought lately while playing with Lego.	
Brand Community Belonging	I feel part of the LEGO community.	M.M. XU. (2012) ^[8]
	I'm honored to be a part of the LEGO Brand community.	
	I hope to always be able to communicate in the LEGO community.	
	I don't miss the opportunity to interact with other members if there's nothing special going on.	
	I would like to be actively involved in the LEGO community organization.	
	Members of the LEGO community often take my opinions seriously.	

Variable	Item	Source
brand loyalty	Next time I buy, I'll go for the LEGO brand.	M.M. XU. (2012) ^[8]
	I will buy other products or services from the LEGO brand if needed.	
	I would highly recommend the LEGO brand to others.	
	Even if the price of LEGO products goes up, I'm still willing to buy the brand.	
	I'm willing to pay a higher price for the Lego brand compared to other brands.	
	Members of the LEGO community will join me in discussing negative feelings about other competing brands' products.	
	I would express negative things to others about other competing brands' products.	

4. Results

4.1 Reliability of Measurements

In this study, exploratory factor analysis (EFA) was conducted using SPSS to validate the factor validity. The reliability of the questionnaire scales of User Value Co-creation, Heart Flow Experience, Brand Community Belonging and Brand Loyalty was measured by internal consistency. Table 3 shows the results of reliability analysis using Cronbach's alpha. According to the structure of the correlation theory, there are 31 entries consisting of 4 factors, and the total variance explained by these factors is 60.720%. The results of the reliability analysis of Cronbach's alpha: user value co-creation ($\alpha=.895$), mindstream experience ($\alpha=.913$), brand community belonging ($\alpha=.863$), interactivity ($\alpha=.886$), and brand loyalty ($\alpha=.928$). All constructs had Cronbach alpha values of 0.5 or higher, demonstrating high reliability.

Table 3. Factor Analysis Results

	Component				Communality
	1	2	3	4	
					.557
G1	.728				.587
G2	.749				.605
G3	.742				.595
G4	.743				.592
G5	.721				.583
G6	.734				.570
G7	.725				.574
G8	.734				.604
X1		.732			.518
X2		.677			.632
X3		.770			.607
X4		.759			.582
X5		.721			.545
X6		.697			.561
X7		.709			.575
X8		.720			.506
X9		.673			.550
X10		.699			.549
P1			.713		.600
P2			.735		.614

	Component				Communality
P3			.762		.633
P4			.769		.607
P5			.745		.577
P6			.722		.724
Z1				.777	.738
Z2				.756	.657
Z3				.720	.702
Z4				.759	.674
Z5				.722	.701
Z6				.731	.700
Z7				.719	.557
Dispersion rate(%)	18.728	15.450	14.486	12.056	
Accumulation rate(%)	18.728	34.178	48.664	60.720	
Cronbach's Alpha	.895	.913	.863	.928	
KMO(kaiser-Meyer-Olkin)=0.946 Bartlett's Test of Sphericity=5264.933 Degrees of Freedom =465 Significance Probability = 0.000					

4.2 Hypothesis test

In order to test the hypotheses, a regression model was constructed by setting the dependent variable as brand loyalty and the independent variable as user value co-creation. As shown in Table 4, the t-value of user value co-creation on brand loyalty is 9.300 ($p=.000$), which is statistically significant, therefore, the main effect of this study, i.e., hypothesis 1 is valid. In the regression model, the F-value is 86.489, $p=.000$, which is statistically significant. The r-squared coefficient of the regression equation was .219, which explained 21.9% of the total variation. This study confirms that user value co-creation has a positive and significant effect on brand loyalty.

Table 4. Main effects test

Model B		Unstandardized Coefficient		Standardized Coefficient	t	p-value
		Standard Error	β			
1	constant	1.269	.258		4.925	.000
	G	.598	.064	.468	9.300	.000
R=.468 R-Squared (R^2)=.219 Modified R-squared=.217 Durbin-Watson=2.190 F=86.489 $p=0.000$						

implicit variable: brand loyalty

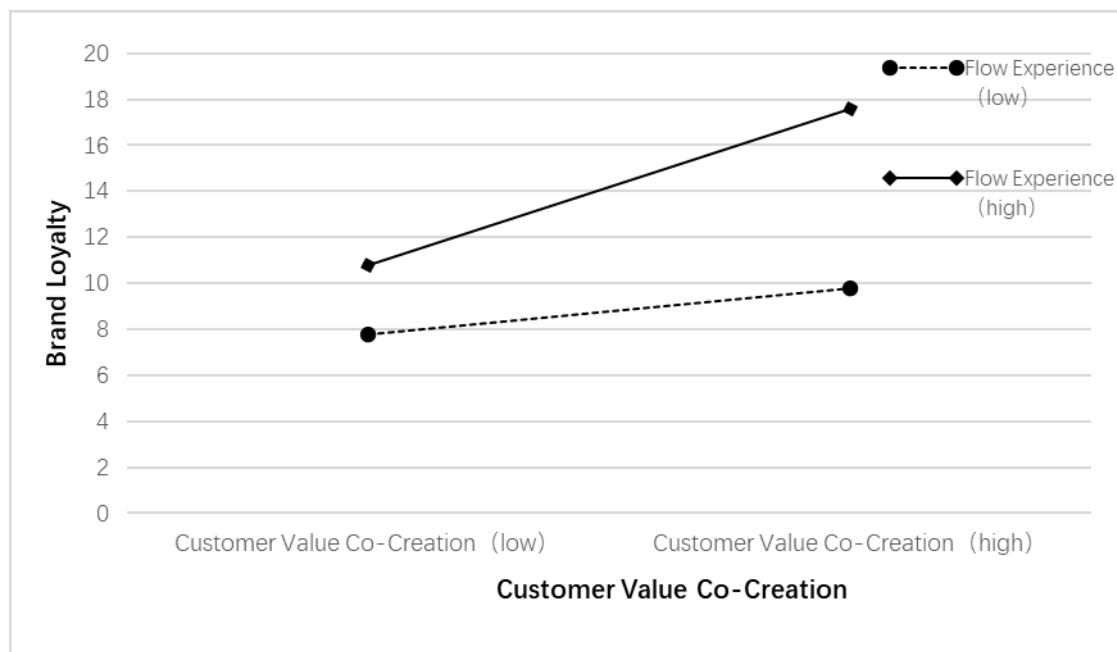
Next, in order to explore the moderating effect of heartflow experience, SPSS Process Macro (Model 1) was used for the analysis. As shown in Table 5, the results of the analysis show that the heartflow experience plays a moderating role in the effect of user value co-creation on brand loyalty, and Hypothesis 2 is adopted. As shown in Fig.2, user value co-creation can increase brand loyalty more significantly at high levels of heartflow experience.

Table 5. A test of the moderating effect of the mind-flow experience

Variable	B	β	t-value
User value co-creation	.598	.468	4.925***
Heart Flow Experience	.768	.565	12.017***
User Value Co-Creation* Heart Flow Experience	.134	.641	14.659***

<.05, *<.01

Fig 2. Moderating effects of the heart flow experience



In order to verify how community belonging mediates the effect of user value co-creation on brand loyalty, this study analyzed the relevant data using SPSS Process Macro (Model 4). The results are shown in Table 6. The results show that the [LLCI, ULCI] of the direct, mediated, and total effects do not contain zero, i.e., brand community belonging plays a partially mediating role in the influence of user value co-creation on brand loyalty, which is statistically significant.

Table 5. A test of the mediating effect of brand community belonging

Effect	B	SE	95%CI		Effect in %
			LLCI	ULCI	
Direct effect	.4808	.0603	.3622	.5994	80.43
Indirect effect	.1170	.0341	.0539	.1865	19.57
Total effect	.5978	.0643	.4713	.7243	100.00

5. Conclusions

Taking LEGO brand as the empirical object, this study systematically explores the mechanism of user value co-creation on brand loyalty, and reveals the moderating role of mind-flow experience and the mediating path of community belonging. The main findings are as follows:

5.1 The direct drive of user value co-creation on brand loyalty

The data analysis shows that LEGO users' participation in value co-creation (e.g., product design, content generation, etc.) significantly enhances their loyalty to the brand, which verifies the applicability of the theory of value co-creation in the field of physical products. This result is consistent with the "co-creation of value" proposed by Prahalad and Ramaswamy (2004),

which suggests that user participation not only enhances brand identity, but also strengthens long-term loyalty behaviors through emotional connection ^[13].

5.2 The moderating role of mindstream experience: the reinforcing effect of immersive participation

Mindstream experience plays a significant positive moderating role between value co-creation and brand loyalty. When users enter a “mindstream state” during the co-creation process (e.g., building challenges and skill matching, instant feedback mechanisms), their engagement and enjoyment will further amplify the effect of brand loyalty. This finding extends Csikszentmihalyi’s (1990) theory of mindstream, which emphasizes that companies need to optimize the user immersion experience through task design and interaction mechanisms ^[14].

5.3 The mediating path of community belonging: an emotional bond from co-creation to loyalty

Community belonging assumes a partially mediating role between value co-creation and brand loyalty, suggesting that users strengthen their sense of belonging to the LEGO fan community through co-creation behaviors, which translates into loyalty to the brand. This echoes McAlexander et al.’s (2002) brand community theory, which reveals the transmission logic of the “user-community-brand” triad ^[15].

Through the analysis of the results, LEGO and other companies can enhance user loyalty by opening up co-creation platforms (e.g., LEGO Ideas), designing step-by-step challenge tasks (to stimulate the flow of mind), and strengthening community interactions (e.g., offline fan festivals). It is recommended that brand managers incorporate “mindstream experience design” into the user co-creation process, e.g., through gamification mechanisms to balance the difficulty of the tasks with the ability of the users.

This study focuses on the adult population, and there is a selective bias in the sample coverage. In the future, we can compare the differences between regular consumers and heavy users, or include LEGO communities from other cultures (e.g., Asian markets). Brand loyalty may be influenced by product scarcity (e.g., LEGO limited edition models) or premium prices in the secondary market. It is recommended that subsequent studies introduce control variables (e.g., collecting motivation, resale behavior) to strip away the purely emotional loyalty effect.

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Conflict of Interests

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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