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The impact of gamification of m-commerce platforms on users' impulse buying behavior

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Abstract: *Gamification is considered one of the most effective marketing strategies for the future, enhancing the appeal of products or services to consumers. In recent years, major mobile e-commerce platforms have increased their degree of gamification. While previous research has suggested that mobile e-commerce might stimulate consumers' impulsive buying behavior, the extent to which gamification influences users' impulsive buying behavior remains largely unexplored. Against the backdrop of the Double Eleven shopping festival on e-commerce platforms, this study designed two interfaces with varying degrees of gamification and employed a scenario-based experimental method to measure the effects of gamification on users' perceived enjoyment and social interaction, as well as impulsive buying behavior. The findings indicate that on e-commerce platforms with a higher degree of gamification, users exhibit stronger impulsive buying behavior. Furthermore, the results empirically support the role of perceived enjoyment and social interaction as motivational mechanisms of gamification and predictive factors for users' impulsive buying behavior. These insights contribute to a deeper understanding of the mechanisms of gamification for e-commerce platform designers and provide theoretical support for their endeavors.*

Keywords: *Gamification, Impulse Buying, M-commerce, Double Eleven shopping Festival*

1. Introduction

As online shopping becomes a major sales channel, researchers are increasingly concerned with improving the attractiveness of e-commerce platforms to users, and gamification is considered a technique with great potential to achieve this goal. Gamification refers to the introduction of game elements into non-game contexts to influence user behavior by implementing game elements similar to points, badges and leaderboards to mimic in-game interactions and motivations.[1]

In 2018, Alibaba's Tmall and Taobao shopping platforms launched a gamification system on the occasion of the 10th anniversary of the Double 11 shopping festival. Participants could invite other users to work together to complete specific game tasks and earn corresponding shopping bonus reward points or badges from prizes totaling up to RMB 10 billion. In just one week, the "Collect Energy" game launched in 2018 attracted nearly 300 million Taobao users. In the same year, Tmall's Double 11 sales exceeded the 200 billion yuan mark, with a turnover of 213.5 billion yuan, an increase of 26.9 percent over 2017. This clearly shows that the introduction of gamification elements in e-commerce platforms has led to a large user scale and user activity, which has a significant impact on user purchasing behavior.[2]

It is worth noting that about 40% of current online shopping consumption comes from Impulse buyings. Javadi, Dolatabadi, et al. (2014) found that by introducing gamification elements, such as reward mechanisms and challenges, into mobile service settings, users can be motivated to make purchases and engage in impulse buying behavior. Two important features of e-commerce websites - interactivity and having fun - facilitate users' free choice of information on the website, enhance communication with other consumers, and create a positive attitude towards the website, which enhances their online purchasing behavior. The gamified interfaces launched by e-commerce platforms during the Double 11 campaign tend to be hedonistically oriented (mini-games and game-like interfaces) and socially oriented (interactive cooperation and sharing among friends, etc.). It can be inferred that e-commerce websites with a high degree of gamification will be more interactive and interesting. Therefore, in this study, perceived enjoyment and social interaction were chosen as predictors of gamification mechanisms and impulse buying behavior.[3]

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2. Literature review and research hypotheses

Gamification has been analyzed from different perspectives with different definitions.Huotari and Hamari (2017) explain gamification from the perspective of service marketing as a service system with special rules that enable human-computer interaction and information feedback, creating economic value for the firm by providing services and support to consumers. Werbach and Hunter (2014), on the other hand, consider gamification as a technological tool to promote products and services. The widely accepted and recognized definition of gamification comes from Deterding (2011), who sees gamification as the application of game design elements in non-game contexts. Some scholars suggest using gamification as a tool to influence customers' purchasing decisions in order to increase sales effectiveness. Currently, gamification elements are often applied to online shopping sites for content creation or advertising.[4]

Gamification plays a huge role in the marketing field.A study based on cognitive appraisal theory by Xu, Chen, Peng et al. (2020) found that rewards, autonomy, and immersion in gamified elements increase consumer enjoyment, which, in turn, promotes online purchase intention. Pour, Rafiei, Khani et al. (2021) investigated the impact of gamification on customer experience in terms of mediation of customer brand engagement and found that gamification positively affects customer brand engagement, which in turn positively affects customer experience.Xi and Hamari (2020) investigated the relationship between gamification features, brand engagement, and brand equity across different categories, and the results showed that gamification has an impact on brand engagement, which in turn has an impact on brand equity. Thus, gamification plays an important role in the marketing domain, delivering benefits such as strengthening customer brand loyalty, improving customer experience, and enhancing customer purchase intention. However, few studies have explored the impact of gamification on users' impulse buying behavior.[5]

Impulse buying refers to sudden, hedonistic, unplanned purchases (Bayley and Nancarrow, 1998). Online shopping is more likely to elicit impulse buying behavior than traditional retail channels due to its convenience, personalization and price advantage (Donthu and Garcla, 1999). Previous studies on the antecedents of impulse buying behavior have focused on the shopping environment (Mohan, Sivakumaran and Sharma, 2013), the shopping context (Hausman, 2000; Dholakia, 2000; Mai, Jung, Lantz et al. 2003; Crawford and Melewar, 2003), the marketing mix (Kacen, Hess, Walker, 2012; Mohan, 2013), and individual consumer traits (Dittmar, 1996; Dittmar, 2005; Sengupta and Zhou, 2007) perspectives, very few studies have considered the impact of the use of gamification on impulse buying behavior. Studies have found that hedonic and utilitarian browsing on e-commerce platforms can have an impact on users' impulse buying behavior (Kimiagari and Malafe, 2021). Whereas gamification, as a system that combines utilitarian purpose and hedonic design (Koivisto and Hamari, 2019), can provide both hedonic browsing that is purely about playing a game, as well as facilitating utilitarian browsing by providing some incentives, gamification is likely to have an impact on users' impulsive buying behavior. In addition, some external stimuli, such as product or shop features, can have an impact on customers during the decision-making process of impulse buying. In gamified e-commerce platforms, game-like graphics with strong visual encouragement and promotions using various gamified elements of reward mechanisms (e.g., points, feedback, badges) can act as an external stimulus to influence users' purchase intentions. This supports the idea that gamification can have an impact on users' impulse buying behaviour.[6]

Gamification aims to increase consumer motivation through various incentives, promote consumer engagement in gamified activities, and provide an enjoyable experience (Conaway and Garay, 2014; Xi and Hamari, 2020).Huotari and Hamari (2017) argued that gamification enhances consumer enjoyment in online shopping. In addition, another advantage of gamification is that it creates social value for consumers (Nambisan and Baron, 2009).Thom, Millen, and DiMicco (2012) found that decreasing the level of gamification negatively affects social networks, specifically, decreasing the level of gamification affects user contributions, interactions, and engagements, and users' original content (UGC) will decrease accordingly.Rigby and Ryan (2011) state that gamification can facilitate social interaction in communities and be a tool for gaining social recognition. During gameplay, people can often compete or co-operate with others and thus perceive social impact. The reward mechanism of gamification can provide rewards for users, encourage participation, enhance cooperation between different users, promote the exchange of ideas and increase social interaction.[7]

Therefore, the study proposes the following hypotheses:

H1: The degree of gamification of the e-commerce platform positively promotes users' impulse buying behaviour.

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H2: The degree of gamification of e-commerce platform positively promotes users' perceived fun.

H3: The degree of gamification of e-commerce platforms positively promotes users' social interactions.

Perceived fun can be used to explain people's intentions or attitudes. According to the theory of mind-flow, when an activity brings greater pleasure, an individual's desire to repeat the activity increases (Skadberg and Kimmel, 2004). In a state of mind-flow, consumers are more likely to engage in a variety of different activities, including shopping, because the pleasurable experience of the activity causes the individual to lose a sense of time while focusing on the activity. Similarly, in online shopping environments, the likelihood that users will make an impulsive purchase decision increases with increased pleasure while using the platform (Jeffrey and Hodge, 2007). In the existing literature, perceived enjoyment has been identified as a distinct emotional response to consumer Impulse buyings (Parboteeah, Valacich, Wells et al., 2009).Sohn and Lee (2017) show that consumers' emotional experiences have a strong positive influence on consumer impulse bbehavior. During the Double 11 shopping festival, perceived enjoyment refers to the level of pleasure an individual receives by browsing products and making purchases during the gamified online shopping process (Xu, Benbasat, Cenfetelli, 2014). Intuitively, consumers may be less likely to engage in purchasing activities when they feel unhappy or fulfilled.[8]

Therefore, the study proposes the following hypothesis:

H4: Perceived fun will positively promote users' impulse buying behaviour.

Social interaction represents the extent to which users perceive interpersonal relationships with others on social platforms, including the strength of the relationship, the time commitment, and the frequency of communication (Chiu, Hsu, Wang, 2006). Social interaction is an important prerequisite for influencing consumers' purchasing behaviour, especially in the e-commerce domain, as consumers are unable to experience the goods they are interested in as directly as they would in a physical shop (Lu, 2014; Wang and Yu, 2017). In an e-commerce environment, information exchange is a key interaction between users. Consumers collect information before purchasing products online and seek online guidance by analysing reviews, ratings, recommendations and feedback from other customers (Cheung and Thadani, 2012). These exchanges of information can increase the likelihood that consumers will be influenced by other users and thus be prone to follow the advice of others and exhibit impulsive purchasing behaviours (Adjei, Noble et al., 2010).Zhang, Hu et al. (2014) state that individuals who interact with other consumers on group-buying websites are more likely to make impulsive purchases.Kamaruddin and Mokhlis (2003) argued that social influence is important for young people's brand attitudes and purchase decisions. During the Double Eleven shopping festival, social interaction refers to the aggregation, intensive interactions and close relationships that consumers develop by engaging in gamified online shopping tasks. On gamified online shopping platforms, consumers have the opportunity to share information and communicate with others (e.g. peers or friends) to complete various tasks. This helps to increase their awareness of and desire to shop for specific products, which in turn increases the probability of Impulse buyings (Vehagen and van Dolen, 2011; Xiang, Zheng, Lee, et al. 2016; Zhang, Hu, Zhao, 2014).[9]

Therefore, the study proposes the following hypothesis:

H5:Social interaction positively promotes users' impulse buying behaviour.

Based on the above assumptions, this paper constructs a theoretical model (see Figure 1).

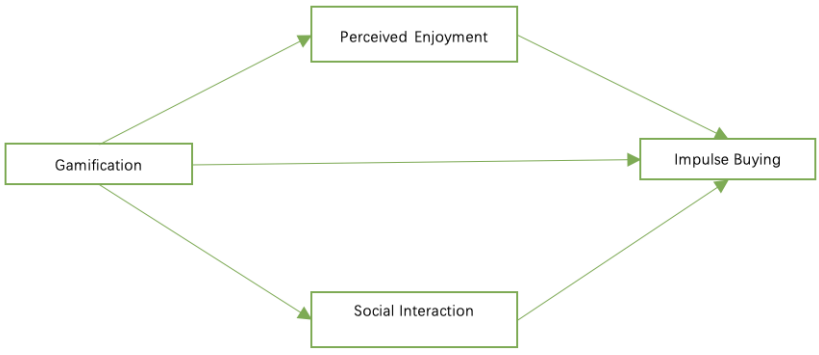

Figure 1 Theoretical Model

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3. Research Methodology

In this study, the group scenario experiment method was used to design the e-commerce platform interface with two degrees of gamification, as shown in Figure 2. Eight gamification elements were displayed in the interface with a high degree of gamification, while the interface with a low degree of gamification only retained the basic function of gaining points by completing tasks. In order to minimise distractors, the experiment had the same visual design (e.g., the same red packet denomination, interface image size, and thematic style) for both gamified activity interfaces. Participants were randomly assigned to one of the two contexts, and participants assessed the degree of gamification, perceived fun, social interaction and Impulse buying intention after viewing the Double Eleven campaign interface.[10]

Figure 2. Interfaces of e-commerce platforms with different degrees of gamification

Data were collected during September-October 2022 through the Seeing Numbers platform (https://www.credamo.com/). Some invalid questionnaires were removed based on the following criteria: 1) respondents did not shop during the Double Eleven period; 2) respondents did not participate in the Double Eleven game; 3) respondents provided the same answers to all questions; and 4) respondents took less than 100 seconds to complete the questionnaire. In the end, 564 valid questionnaires were collected (275 in the high gamification group and 289 in the low gamification group). The experimental questions consisted of three parts; the first part collected demographic information about the respondents. The second part asked respondents to rate the level of gamification of the interface and was used to test the manipulation effect of the experiment. In the third part, participants were asked about their perceived enjoyment of the interface they viewed as well as their propensity for social interactions and Impulse buyings, using well-established scales from previous related literature with some modifications to suit the present study, and a 7-point Likert scale was used for each question (1=strongly disagree 7=strongly agree). Information on the structural characteristics of the sample is detailed in Table 1. Out of the 564 respondents, 282 (50%) were female respondents and 282 (50%) were male respondents. After the questionnaire was filtered, it can be seen that the subjects who participated in the Double Eleven game were concentrated in the age groups of 24-30 years (45.2%) and 18-23 years (31.2%).[11]

Table 1. Characterisation of the sample structure

Item	category	Frequency	Percent
Gender	Male	282	50%
	Felmale	282	50%
Age	<18	16	2.8%
	18-23	176	31.2%
	24-30	255	45.2%
	31-40	99	17.6%
	>40	18	3.2%
Income(Per year)	<1500 RMB	38	6.7%
	1500-2999RMB	100	17.7%
	3000-4999RMB	197	34.9%
	5000-7999RMB	160	28.4%
	>8000RMB	69	12.2%
Online shopping experience (year)	<1year	37	6.6%
	1-3 years	200	35.5%
	3-5years	146	25.9%
	>5years	181	32.1%

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4. Results

4.1. Manipulation Test

In order to determine whether the group manipulation of the degree of gamification was successful, an independent samples t-test was used in this study. The results of the manipulation for the two experimental groups are shown in Table 2; therefore, this study successfully manipulated the degree of gamification. Next, we took the t-test for hypothesis analysis, and the results showed that participants in the high gamification level group had a significantly higher propensity to make Impulse buyings (M=5.4, SD=0.858) than those in the low gamification level group (M=4.48, SD=1.013), with t(564)=11.676, p=0.016 (<0.05). Thus H1 was validated.[12]

Table 2. Manipulation check

Group	**M**	**SD**	**P**	**t**	**Sig.**	**95%CI**
high gamification	5.14	0.815	.046	26.794	.000	1.549-1.792
low gamification	3.47	0.652				

4.2.Validity and reliability

The reliability of the construct scales involved in the model was tested using AMOS 24. The results showed (Table 3) that Cronbach's alpha was greater than 0.7 for all constructs, confirming the reliability of internal consistency. In addition, the AVE of each construct was greater than 0.5 and the CR was greater than 0.7, which proved that the scale had good convergent validity. In this study, the scale was tested for discriminant validity using the Fornell-Larcker criterion, and as shown in Table 4, the square root of the AVE for each construct is higher than its correlation coefficient with any other construct, and we can assume that its discriminant validity is good. Therefore, the selected scale has sufficient reliability and validity.[13]

Table 3. Validity and reliability

Constructs	Items	Esimate	S.E.	P	Loading	Cronbach's alpha	CR	AVE
Gamification	G1	1.000			0.774	0.799	0.804	0.577
	G2	0.823	0.051	***	0.745			
	G3	0.798	0.049	***	0.760			
Perceived Enjoyment	PE1	1.000			0.792	0.817	0.819	0.601
	PE2	0.975	0.059	***	0.756			
	PE3	0.912	0.054	***	0.777			
Social Interaction	SI1	1.000			0.808	0.872	0.873	0.633
	SI2	1.023	0.050	***	0.815			
	SI3	0.852	0.045	***	0.765			
	SI4	0.875	0.044	***	0.793			
Impulse Buying	IB1	1.000			0.856	0.928	0.930	0.725
	IB2	0.949	0.036	***	0.858			
	IB3	1.041	0.040	***	0.850			
	IB4	0.996	0.038	***	0.850			
	IB5	1.131	0.044	***	0.844			

Table 4. Discriminant validity

Construct	Gamification	Perceived Enjoyment	Social Interaction	Impulse Buying
Gamification	0.760			
Perceived Enjoyment	0.421	0.775		
Social Interaction	0.362	0.195	0.796	
Impulse Buying	0.651	0.553	0.534	0.851

Note: The diagonal is the square root of the AVE of the corresponding conception.

In Table 5, the results of the validated factorial model (CFA) showed that all constructs had acceptable fit indices: $\chi 2 = 102.834$, degrees of freedom (df) = 84, $\chi 2/df = 1.224$ (less than 3), GFI = 0.877, CFI = 0.996, and Root Mean Square of the Error of Approximation (RMSEA) = 0.034 (less than the critical level of 0.08). Therefore, the model is well fitted as suggested by Hair, Black, Babin and Anderson (2010).[14]

Table 5. CFA Model Fit

Indicators	$\chi 2$	df	$\chi 2/df$	RMSEA	GFI	AGFI	IFI	TLI	CFI
Refer		<3	<0.08	>0.8	>0.8	>0.9	>0.9	>0.9	
Result	102.834	84	1.224	0.034	0.877	0.966	0.996	0.995	0.996

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4.3. Common methodological deviations

Survey-based studies that collect data from the same source may be subject to common method bias (CMB). In order to assess the CMB issue, we used Harman one-way method for common method bias test (Podsakoff et al., 2003), we used SPSS 26 to analyse the data and the results in Table 6 showed that the unrotated exploratory factor analysis extracted the first factor with eigenvalue greater than 1 with an explanatory rate of 43.45%, which is less than 50%, therefore the data does not suffer from common method bias.

Table 6. Harman's single-factor approach

Component	Initial eigenvalues of constituents			Extract the sum of the squares of the loads		
	characteristic root	variance %	accumulate %	characteristic root	variance%	accumulate%
1	6.517	43.448	33.07	6.517	43.448	43.448
2	2.19	14.598	44.59	2.19	14.598	58.046
3	1.386	9.239	55.29	1.386	9.239	67.285
4	1.088	7.255	62.34	1.088	7.255	74.54

4.4. Modelling path analysis

The Process macro of SPSS was used to test the model paths by applying Model4, and analysing the R2 of all endogenous variables, it can be obtained that the research model explains 34.36% of perceived pleasure, 30.42% of social interaction, and 71.15% of Impulse buyings, and it can be seen in Table 7 that all the direct paths in the research model are positive and statistically significant. Therefore, the model supports hypotheses H1- H6.

Table 7. The Results of Modelling path analysis

Hypethesis	**Path**	**coefficients**	**Standardized coefficients**	**SE**	**t**	**p**	**95%CI**		**Conclusion**
							low	**up**	
H1	Gamification→ Impulse Buying	0.3381	0.3607	0.0308	10.993	0	0.2777	0.3985	Supported
H2	Gamification→ Perceived Enjoyment	0.3276	0.3436	0.0378	8.6742	0	0.2534	0.4018	Supported
H3	Gamification→ Social Interaction	0.3168	0.3042	0.0419	7.5691	0	0.2346	0.399	Supported
H5	Perceived Enjoyment→ Impulse Buying	0.3006	0.3059	0.0311	9.652	0	0.2394	0.3618	Supported
H6	Social Interaction→ Impulse Buying	0.2898	0.3221	0.0281	10.312	0	0.2346	0.345	Supported

4.5. Mediating Test

In order to further explore the influence mechanism and significance level of the mediating effect of perceived fun and social interaction, this paper used bootstrap to conduct a secondary analysis, and the results are shown in Table 8, it can be seen that all the mediating paths of the model are significant at the 95% confidence interval, and both perceived fun and social interaction positively mediate the relationship between the degree of gamification and impulse buying. The direct effect of gamification level on Impulse buying accounted for 63.99% of the total effect, the indirect effect of gamification level on Impulse buying through perceived fun accounted for 18.64% of the total effect, and the indirect effect of gamification level on impulse interaction through social interaction accounted for 17.37% of the total effect. In addition, this study calculated the VAF of the two mediation paths to determine the degree of mediation, in which the VAF of perceived fun = 22.55% and the VAF of social interaction = 21.36%, with a VAF of less than 80%, which are both partially mediated.[15]

Table 8. The results of Mediating Test

	Path	**(/Total Effect)**	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**
Direct Effect	Gamification → Impulse Buying	63.99	0.3381	0.0308	0.2777	0.3985
Indirect Effects	Total	36	0.1903	0.021	0.1502	0.2323
	Gamification → Perceived Enjoyment → Impulse Buying	18.64	0.0985	0.0149	0.0707	0.1297
	Gamification → Social Interaction → Impulse Buying	17.37	0.0918	0.0153	0.0625	0.1232
Total Effect	Total	100	0.5284	0.0326	0.4643	0.5925

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5. Conclusions

Taking the Double Eleven Shopping Festival of the e-commerce platform as the research background, this study selected the users who participated in the gamification experience of the e-commerce platform as the research objects, studied the impulse buying behaviour of the users through the situational experimental method, and constructed a model of the mechanism of the influence between the degree of gamification of the e-commerce platform and the impulse buying behaviour of the users and came up with the following main conclusions:

The results of the group experiments show that the degree of gamification of the e-commerce platform does affect users' impulse buying behaviour. Participants in the experimental group with a high degree of gamification showed stronger impulse buying behaviour. In addition, the degree of gamification of an e-commerce platform positively affects both users' perceived fun and social interactions. This study also verified the positive effect of perceived fun and social interaction on impulse buying behaviour.

This study reveals the mediating mechanism between gamification and impulse buying. Specifically, with reference to the hedonic-orientated and social-orientated characteristics of e-commerce platforms, the study explored the mediating role of perceived enjoyment and social interaction between the degree of gamification on e-commerce platforms and impulse buying behaviour. The results showed that both perceived enjoyment and social interaction positively mediated the relationship between the degree of gamification and impulse buying, and both mediation paths were partially mediated.

This study establishes a richer theoretical link between gamification and impulse buying behaviour. While previous studies on the factors influencing impulse buying behaviour have mostly considered the shopping environment (external stimuli) and the shopper's personal characteristics (internal stimuli), this study introduces the concept of gamification to explain the impulse buying behaviour of e-commerce platform users.

The results of this study provide important guidance for e-commerce platform gamification designers. Since the degree of gamification in e-commerce platforms does increase users' impulse buying behaviour, it is still a trend to apply gamification design to attract users to spend money. This can be done by setting up gamified reward mechanisms such as points, prizes, badges, etc., as they can give consumers a sense of achievement and motivate them to stay positive by completing challenges through their personal efforts and receiving instant feedback. In addition, gamification elements with social attributes, such as avatars and leaderboards, can be added to promote social interaction behaviours among users and motivate them to complete specific behaviours. Because humans are social animals, it is often easier to persevere with friends or others working towards a common goal compared to acting alone.

Up to now, research has focused on analysing the impact of the degree of gamification on users' impulsive purchasing behaviours, while the impact of specific gamification incentives has not yet been studied in depth. Therefore, future research can break down gamification as a whole into individual gamification elements and study their impact on users' impulse buying behaviour. In addition, the influence of users' personal characteristics can be considered, taking into account previous research on intrinsic stimuli affecting impulse buying behaviour.

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