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Determinants Influencing Consumer Repurchase Intention on IoT Products: Moderating Effects of Brand Image

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Abstract

Purpose: Despite the increasing adoption of IoT devices, there is limited understanding of what drives customers to repurchase these products. The purpose of this study is to examine the factors that influence consumers' willingness to re-purchase IoT products. Furthermore, the moderating role of brand image between consumer psychology and consumer satisfaction was assessed.

Design/methodology/approach: The expectation confirmation model has been extended using perceived values, perceived convenience, perceived convergence, perceived safety and perceived enjoyment. Consumer psychological factors are added as independent variables and brand image was added as a moderator variable between consumer psychological factors and satisfaction. This study used quantitative research involving 360 users who had purchased and used IoT products. The analysis of data is conducted by using a partial least square analysis. SmartPLS was used to conduct validity analysis, reliability analysis, regression analysis and correlation analysis on the collected questionnaires.

Findings: The study shows that perceived usefulness, perceived convenience, and perceived integration have significant effects on consumer satisfaction. In addition, satisfaction has a very significant effect on the re-purchase intention. The results show that neither curiosity nor trust is a factor that influences consumer satisfaction with IoT products, which indirectly leads to the fact that the mediating and moderating variables do not play a role in these two variables.

Practical implications: The results of this study provides a valuable reference for future related research; and it helps companies developing in the field of IoT to better understand customer preferences so that they can change the product's own factors in order to gain customer satisfaction.

Originality/value: This study is based on the current IoT background in China and takes Chinese people as the population. This results in a small research scope and the data obtained cannot explain the repurchasing intention of people in other countries. This paper applies brand image as a moderating variable in the ECT model, but no tests are conducted in advance to verify it before application. Finally, this study also serves as a reference for future related literature.

Keywords: Internet of Things, Expectation Confirmation Theory, Re-purchase Intention, Chinese Brand Image.

Classification: Research paper

Introduction

The Internet of Things has gained popularity recently and has the potential to completely change the way we work and live. Customer intention to repurchase is one area where IoT products has had a very big influence. Numerous studies have examined how IoT product properties affect consumers' desire to repurchase, emphasizing the value of features like connectivity, interaction, presence, intelligence, ease, and security. (Pinochet et al., 2018a)(Y. P. Chang et al., 2014). These characteristics are closely linked to the emotional and functional experience of the customer and how each influences the intention to repurchase the product. (Pinochet et al., 2018a). Convenience, telepresence, connectedness, and security have all been demonstrated to favorably impact repurchase intention, with emotional experience being the main beneficiary. (Y. P. Chang et al., 2014). However, other elements, such risk awareness and fears, might also have a detrimental impact on a person's readiness to purchase.

The body of current research offers insightful information about the connection between customers repurchase intentions and the Internet of Things. For instance, a study by Boulos and Al-Shorbaji identifies six characteristics of Internet of Things (IoT) devices and their clear connection to the functional and emotional experiences of users, which in turn affects the users' propensity to repurchase the product. Similarly, research has shown that customer experience (both functional and emotional) is a key mediating variable in the relationship between IoT product features and re-purchase intention (Kamel Boulos & Al-Shorbaji, 2014).

There are still certain gaps in the literature despite the fact that the body of study on this subject is expanding. For example, some studies focus on the positive impact of IoT product attributes on re-purchase intention, while others emphasise the negative impact of perceived risks such as security and privacy issues(Pal et al., 2021; Pinochet et al., 2018). Therefore, a comprehensive analytical and predictive model is needed that takes into account the various factors that influence consumers' re-purchase intentions. Secondly, there are fewer studies related to the impact of IoT products on consumers' repurchase intentions, so the IoT product factor should also be an important influence in the context of the rapid development of the Internet of Things and the increasing number of IoT devices.(Ho-Sam-Sooi et al., 2021; Y. P. Chang et al., 2014).

This study aims to enhance the understanding of repurchase intention of IoT products by evaluating:
a) The direct relationship between consumer perceived value and consumer satisfaction.
b) The direct relationship between consumer psychology factors and consumer satisfaction.
c) The indirect relationship between consumer perceived value and Consumer psychology factors on repurchase intention through satisfaction.
d) The moderating role of brand image between consumer psychological factors and consumer satisfaction.

Literature Review

Consumer Re-purchase Intention

According to (Pandiangan, Resmawa, Simanjuntak, Sitompul, & Jefri, 2021), repurchase intention or interest refers to the assessment of a customer to repurchase a service from the same service provider. Repurchase intention reflects customer satisfaction, measured behaviourally by knowing whether the customer plans to shop or use the company's services again. Typically, several factors impact on consumers' intentions to repurchase (Kenyon & Sen, 2012). Previous academic research has found that many factors have a significant impact on consumers' propensity to repurchase IoT products. These factors can be roughly divided into two categories: perceived value factors and consumer psychological factors. The literature has comprehensively examined the factors that influence consumers' repurchase intentions, especially in the context of the Internet of Things.(Li et al., 2023) emphasise the importance of perceived usefulness and ease of use, stating that these factors have a strong impact on repurchase intentions, whereas perceived risk does not.(Harmawati and Dewanti, 2023) emphasise the importance of consumer satisfaction, service quality, and brand image in promoting the key role of repeat purchases. Similarly, (Suleman et al., 2021) found that trust and convenience are crucial in encouraging consumers' repurchase intentions.(Tsai et al., 2017) and (Park, 2020) further confirmed the importance of perceived usefulness and enjoyment in predicting repurchase behaviour. Furthermore, (Oghuma et al., 2016) and (Mouakket, 2015) show that perceived enjoyment, usefulness, and confirmation significantly affect consumer satisfaction, which in turn affects ongoing use.(Y. P. Chang et al., 2014) extend these findings by incorporating perceived value, trust, curiosity, and fashion, showing that they have a positive impact. Overall, these studies highlight the multifaceted nature of consumer repurchase intentions and emphasise the interplay between perceived value, trust, satisfaction and usability in the IoT market.

Table 1: Overview of factors that influence consumers' repurchase of IoT products

Literature sources	Research Content	Factors	Findings
(Li et al., 2023)	Factors That Influence Consumer Repurchase	Perceived Usefulness, Perceived Ease Of Use, Perceived Privacy Risk	Perceived usefulness and perceived ease of use have a significant impact on repurchase intention, while perceived risk has no significant impact on repurchase intention.
(Harmawati & Dewanti, 2023)	The impact of brand image, service quality, and customer satisfaction on repeat purchase intention	Brand image, Service quality, Customer satisfaction	Consumer satisfaction has a significant positive impact on repurchase
(Suleman et al., 2021)	Exploring the relationship between trust, ease of use after purchase and switching re-purchase intention	Trust, Convenience	Trust and convenience both have a significant positive impact on consumers' repurchase intention

(Tsai et al., 2017)	Behavioural willingness to IoT	Perceived usefulness, Perceived ease of use	Perceived usefulness and perceived convenience both have a significant positive impact on consumers' repurchase intention.
(Park, 2020)	Continued willingness to purchase wearable devices	Perceived enjoyment	Perceived enjoyment has a positive significance on repurchase intention
(Oghuma et al., 2016)	Factors Affecting Consumer Satisfaction in the Communications Industry	Perceived enjoyment, Perceived usefulness, Confirmation	Perceived enjoyment, Perceived usefulness, and Confirmation have a positive and significant impact on consumer satisfaction.
(Mouakket, 2015)	Factors influencing continuance intention to use social network sites	Satisfaction, Perceived usefulness, Confirmation	Perceived usefulness and confirmation have a positive impact on satisfaction, and satisfaction has a positive impact on continued use
(Y. P. Chang et al., 2014)	The impact of IoT characteristics on consumers' repurchase intention	Perceived Value, Trust, Curiosity, Fashion, Satisfaction	Perceived Value, Trust, Curiosity, Fashion, have a positive impact on satisfaction, and satisfaction has a positive impact on consumers' willingness to repurchase

Expectation-confirmation model

In this research, the conceptual framework is developed based on ECT model which is first introduced by Bhattacherjee on 2001. The ECT model has been widely employed by academics to explain why users are more likely to continue using an Information and Communications Technology (ICT) product or service after adopting it. According to the expectation confirmation model, one of the psychological notions that users experience after obtaining and consuming an experience is user-perceived satisfaction (Bhattacherjee & Premkumar, 2004). The current body of study focuses on users' overall perceptions of many parts of their experience, such as their feelings regarding using and repurchasing a good or service. Because of the expectation confirmation model, users' general level of satisfaction with particular information systems and services affects their likelihood of sticking with them. When it comes to smart products, the relationship between customers' perceived level of enjoyment and their intention to use services and products has always been described rather well (Roca et al., 2006). This research focuses on the effects of repurchase intention of certain determinants (divided in to two main parts known as consumer perceived value and consumer psychological factor) and moderating role of brand image and the mediating role of satisfaction.

Mediating Moderator Variables and Conceptual Model

Satisfaction

Customer satisfaction can be defined as the consumer's perception or judgement of a company's ability to meet or exceed the consumer's expectations of the company (Wilson, 2019). In this case, consumers are satisfied only when the company is able to meet or exceed all of their expectations about the performance or quality of the product or service provided by the company. Meanwhile, when a company is perceived to have "failed" to provide consumers with the right or appropriate product or service with a quality similar to that expected by consumers, it can be concluded that the company has failed to meet consumers' expectations of the company, a situation that can lead to dissatisfaction of consumers with the efforts put in by the company. Therefore, inducing or creating satisfaction in the minds of consumers by providing quality products or services that exceed their expectations is something that every company should do, which increases the likelihood that consumers will be loyal to the company, thus enabling the company to fend off its competitors, both in the short term and in the long term (Keni et al., 2020).
Oliver believed that attitudes are influenced by contentment and that attitudes have a positive, direct, and indirect impact with future intentions (Oliver, 1980). At the final step of the satisfaction formation process, customers make the decision whether or not to return to the store (Tsai & Huang, 2007).

Brand Image

When the brand image is good, the value perceived by consumers will be more consistent with the company's reputation and consumers are more likely to maintain positive beliefs, attitudes and behaviours. Thus, a favourable brand image can enhance the perceived effects on consumers and increase customer satisfaction. Conversely, when consumers remember an unfavourable brand image, the organisation's active campaigns may conflict with consumers' perceptions of the firm's reputation. Inconsistency in the cognitive system leads to tension and consumers develop a psychological tendency to balance differences (Leuthesser et al., 1995).
In other words, consumers' causal attributions of PR motives influence their attitudes or behaviours. An unfavourable brand image leads to a negative halo effect and also negatively affects other brand associations (Wirtz & Bateson, 1995).
“A set of perceptions about a brand reflected in the brand associations in the consumer's memory” is how Hsieh and Lindrige define brand image (M. Hsieh & Lindridge, 2005). As per the aforementioned notion, a brand's image can be characterized as a collection of brand associations that are established and ingrained in the minds of consumers. Customers that regularly use a particular brand are more likely to adhere to the company's image.

Conceptual framework

According to the research results of domestic and foreign researchers on IoT product factors, consumer psychological factors and purchase intention, combined with the characteristics of intelligent new products produced by science and technology innovation enterprises, this paper expands other perceived values besides consumers' perceived usefulness on the basis of the

theoretical framework of expectation-confirmation: perceived convenience, perceived convergence, perceived safety and perceived enjoyment. Secondly, consumer psychological factors are added as independent variables. Finally and most importantly, brand image was added as a moderator variable between consumer psychological factors and satisfaction. Therefore, the model in this study is an augmented model based on the expectation confirmation model. As in Figure 1.

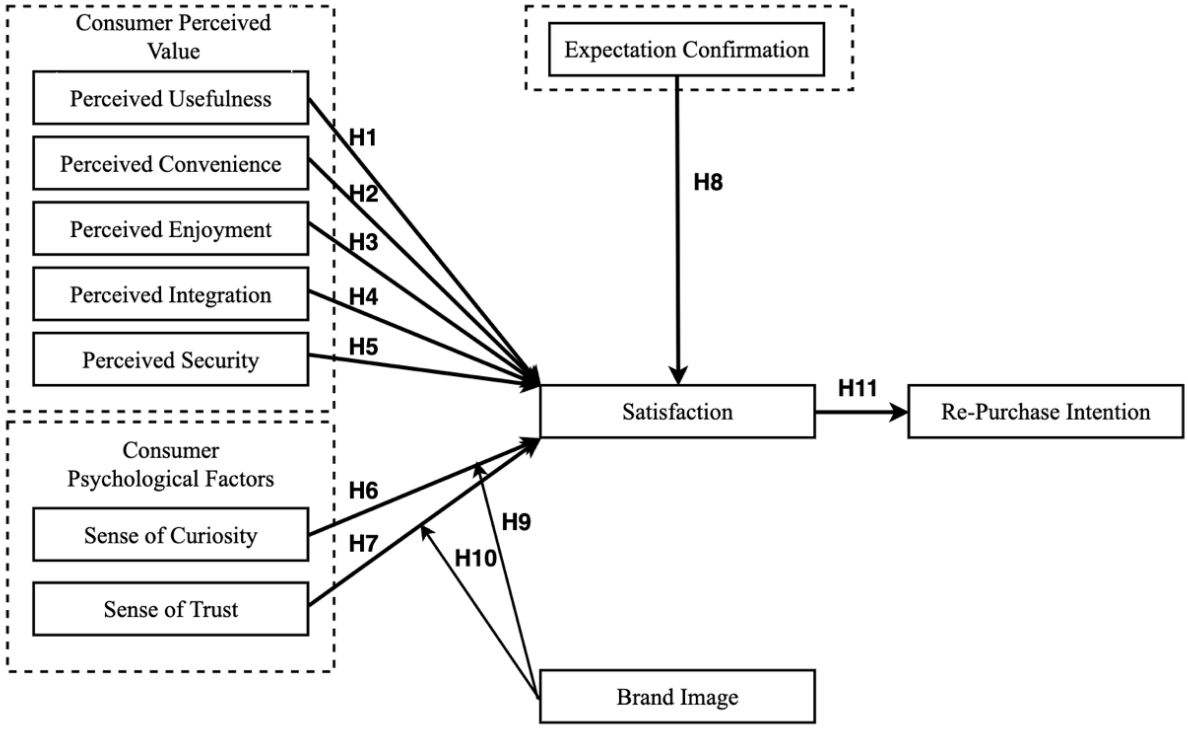

Figure 1: Conceptual Model

Hypotheses development

This research has incorporated ECT theory to develop the hypotheses. When the performance of a company meets the customer' expectation, it leads to higher satisfaction and greater likelihood of repurchase intention. Our hypotheses are developed based on this model by proposing that if customers who already satisfied from the company's services, they will exhibit higher repurchase intention.

Perceived Usefulness

A previous study by (Park & del Pobil, 2013) showed that perceived usefulness has a positive impact on customer satisfaction. Similarly, another study by (Wilson, Keni, & Tan, 2021) also found that perceived usefulness has a positive impact on satisfaction. Further research by (Amin et al., 2014) also demonstrated that the perceived usefulness of mobile websites has a positive and significant impact on customer satisfaction, while other research conducted in Malaysia by (Ariff

et al., 2014) also found that perceived usefulness has a positive impact on satisfaction. Further research by (Sibona & Choi, 2021) on Facebook users found that perceived usefulness had a positive impact on satisfaction. Therefore, this study proposes the following hypotheses:
H1: Usefulness of IoT products positively affects consumer satisfaction.

Perceived Convenience

Previous research by (Rezaei & Amin, 2013) found that perceived convenience has a positive impact on customer satisfaction. In terms of this result, when customers feel that the new technology or product, they are using is effortless and easy to learn and understand, their satisfaction levels increase. Another study by (Amin et al., 2014) further confirmed this finding that perceived convenience has a positive impact on customer satisfaction. Another study conducted by (Tu et al., 2012) in the e-auction market also found that perceived convenience has a positive impact on customer satisfaction. Furthermore, other studies by (Sibona & Choi, 2021) and (Ariff et al., 2014) also found that perceived convenience has a positive impact on customer satisfaction.Therefore, the following hypothesizes will be considered for current study:
H2: Convenience of IoT products positively affects consumer satisfaction.

Perceived Enjoyment

Numerous attempts have been made to look at how customers' perceived enjoyment of a gadget affects their satisfaction and intention to utilize it in the context of mobile and wearable devices (Kwon et al., 2014). See-To et al., for instance, used the replies of 270 participants to explain users' perceived satisfaction and enjoyment with a mobile video application. They discovered a valid correlation between the two (See-To et al., 2012). More than 1,400 mobile social networking game players' data was gathered by Parker et al., who discovered that players' intentions to play the game were highly influenced by their perception of its enjoyment (Park et al., 2014). Thus, in the context of smart wearables, the current study hypothesizes a strong relationship between satisfaction and perceived enjoyment as well as between enjoyment and intention to continue using. Therefore, the following hypothesizes will be considered for current study:
H3: Enjoyment of IoT products will have a positive impact on consumer satisfaction.

Perceived Integration

Speech recognition is a feature that all smart gadgets employ to communicate with users, personalizing interactions and enhancing the user experience (Wang, 2021). The degree to which users believe their interactions with smart devices are two-way, controllable, and behavior-responsive is correlated with interaction (Mollen & Wilson, 2010). Furthermore, because interacting with technology is enjoyable and pleasurable, interaction raises affective value (Yang et al., 2018). Therefore, the following hypothesizes will be considered for current study:
H4: Integration of IoT products positively affects consumer satisfaction.

Perceived Security

IoT-related risks include data security and privacy since sensors have the potential to compromise customer safety if information and data are intercepted by a third party (Peppet, 2014). The notion

of trust holds significant importance in the context of online transactions, since it influences several aspects such as security and privacy concerns. Online retailers are establishing a circle of trust with their customers in an effort to lower these obstacles, and they view customer loyalty as essential (C.-C. Chang, 2013). A key factor influencing the decision to purchase a product is the level of convenience that the device's security affords when connecting to the Internet of Things (Y. P. Chang et al., 2014). Therefore, the following hypothesizes will be considered for current study:
H5: Security of IoT products will have a positive impact on consumer satisfaction.

Sense of Curiosity

The definition of curiosity is an innate urge or incentive to seek out and learn new information (J. A. Litman, 2010). Litman claims that the feeling of curiosity is a result of a relationship between want—that is, the desire for additional knowledge—and expected satisfaction (i.e., liking the information obtained)(J. Litman, 2005). Litman contends that curiosity—the act of seeking information merely for the sake of increasing enjoyment—is consistent with a combination of relatively low desire and fairly high satisfaction. Litman characterizes curiosity as an enjoyable and carefree sense of discovering new information (not necessarily new information). Approach behavior and rewarding experiences are linked to curiosity (J. Litman, 2005), which vary from person to person. Therefore, the following hypothesizes will be considered for current study:
H6: Consumer curiosity about IoT products will have a positive impact on consumer satisfaction.

Sense of Trust

Customers are more likely to shop online and engage in more purchases when they feel trusted (Hong & Cho, 2011; Brynjolfsson & Smith, 2000). Furthermore, (Glaveli, Papadimitriou, Karagiorgos, & Alexandris, 2023) discovered a strong correlation between consumers' repurchase intentions and their level of confidence in online retailers. Therefore, the inclination of customers to purchase is significantly influenced by their level of trust in merchants. Therefore, the following hypothesizes will be considered for current study:
H7: Consumer trust in IoT products will have a positive impact on consumer satisfaction.

Expectation Confirmation

In the context of repurchasing an IoT product, contentment is described in this study as a psychological state that arises from a comparison between the product's performance outcomes and expectations. This study provides empirical evidence that user confirmation is necessary for satisfaction. Similar to the studies of (Thong et al., 2006) and (Recker, 2010), it consistently shows a beneficial effect on satisfaction. Therefore, the following hypothesizes will be considered for current study:
H8: Expectation Confirmation will have a positive impact on consumer satisfaction.

Brand Image

Brand image is an important component of marketing and is also seen as an informational cue whereby consumers infer the quality of a product through the brand image held, which in turn

triggers purchasing behaviour. The researchers of (Diputra & Yasa, 2021), also argued that brand image consists of the consumer's response to a brand name, logo or impression, which also represents a symbol of the product's quality. Therefore, brand image is stored in consumers' memory patterns and quality brand associations will be an important factor in influencing re-purchase decisions.

According to Kamins and Marks, consumers will have higher brand attitudes and re-purchase intentions towards familiar products with a favourable brand image (Bhakuni, Rajput, Sharma, & Bhakar, 2021). Therefore, this study will include the degree of brand image as a dependent variable. This study will examine brand image (Yasmin, 2017) as a moderating variable. Therefore, the following hypothesizes will be considered for current study:
H9: Brand image plays a moderating role between consumer curiosity and satisfaction.
H10: Brand image plays a moderating role between consumer trust and satisfaction.

Satisfaction

Expectation-Confirmation Theory suggests that consumers' willingness to continue using a particular product or service is determined by their satisfaction with the product or service. In today's context of all things smart, the relationship between consumers' willingness to continue using a product or service and consumer satisfaction has been verified in many past studies. For instance, Roca came to the conclusion that customers' inclination to continue using e-learning services is largely determined by how satisfied they perceive themselves to be with the use of these services (Roca et al., 2006). Again, Gupta reached the same conclusion (Gupta et al., 2020) as Park in their study (Park, 2020). Their results indicate that consumers' satisfaction with smart wearable devices will play a significant positive role in influencing their willingness to continue using them (Wen et al., 2021).Therefore, summarising the above, the following hypotheses are proposed in this study:
H11: Consumer satisfaction is positively related to their re-purchase intention.

Method

Data Collection

This study includes a quantitative research involving 360 Chinese users which collected using non-probability purposive sampling techniques. The target population are ranging from 16 to 55 years old, and has purchased and used IoT products at least once. A self-administered questionnaire was generated through the Questionnaire Star tool and actively distributed to the survey subjects through social media platforms such as WeChat, and Weibo. China is the second most populous country in the world, and it is also developing rapidly in the field of IoT. Therefore, it is more universal and persuasive to use Chinese as the survey subjects. Regarding the age of the survey subjects, the youngest is 16 years old and the oldest is 55 years old. The largest number of people aged 35-49 is because the current IoT products are not only for youth or young people, but there are a large number of IoT products specifically for minors and the elderly. Therefore, we cannot leave out these two groups of minors and the elderly. A self-administered questionnaire was generated through the Questionnaire Star tool and actively distributed to the survey subjects

through social media platforms such as WeChat, and Weibo. The survey subjects should not be a certain person or target, but people who meet the screening questions can become the QQ survey subjects, because the study aims to use social media platforms to expand its coverage and involve individuals from different demographics and geographic areas.

The minimum sample size was calculated using G*Power software (Faul et al., 2007).The total sample size calculated by G*power was 123 respondents with a significance level of 0.05, a statistical efficacy of 0.80 and a detectable medium effect size of 0.15 (Cohen, 2013). The number of respondents in this study should not be less than 123 users to prove the validity of the study.

Measurement of Variables

The questionnaire contained 43 questions in total, covering all sections. Section 1 involved 1 filtering question to determine whether the respondent had purchased and used IoT products. Four socio demographic questions about age, gender, income, and education level were added in Section 2. In the meantime, 38 questions on the related variables were found in Section 3. Perceived usefulness, perceived enjoyment, satisfaction, and expectation confirmation were taken from (Park, 2020). Subsequently, perceived convenience was taken from (Cheng et al., 2021; Yeo et al., 2017) and contained six items. Meanwhile, Perceived Integration was adapted from (Chen & Chang, 2023) and covered three items. While Perceived Security was adapted from the measurements of (Cheng et al., 2021; Constantinides et al., 2010) and others, and also contained two items. In addition, Sense of Curiosity was adapted from (Koo & Ju, 2010) and contained three items. Sense of Trust and Re-Purchase Intention are adapted from (Fang et al., 2011). Sense of Fashion is adapted from (Watchravesringkan et al., 2010). Brand Image is adapted from (A. Hsieh & Li, 2008). The research structure and its corresponding items are shown in Table 2 in the Appendix.

Findings

Data Screening

Data screening refers to the identification of data that may negatively impact research outcomes, such as incomplete questionnaires, extreme values that differ significantly from the mean, and outlier questionnaires. The most straightforward form of data screening involves the deletion of questionnaires exhibiting these characteristics. Z-scores are commonly used in data screening. This calculation measures the distance between specific data points and the overall mean, with both positive and negative values. Generally, a Z-score with an absolute value greater than 2.5 is considered to indicate extreme values and outliers (Palaskar & Ambildhok, 2023). In this study, a total of 404 complete questionnaires were collected.

Table 2: Data screening

	N	Percentage
Total data volume	404	100%
Z score absolute value>2.5	44	10.89%
Result after deletion	360	89.11%

After data screening, the number of valid questionnaires retained was 360.

Demographic Analysis

In this study, there were more female respondents, possibly related to the higher spending power and enthusiasm of female consumers in China. The ages of respondents were predominantly between 20 and 50 years old, aligning with China's demographic profile, which has a higher number of middle-aged individuals. In terms of income, there were fewer respondents earning over 10,000 RMB (1380.5 USD). This result may reflect China's relatively low average income per capita (12,720.2 USD). China's overall education level is relatively high, with 67.2% of the respondents having a bachelor's degree.

Table 3: Demographic Profile of the respondents

Item	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	262	72.8	72.8	72.8
	Male	98	27.2	27.2	100.0
Age	Below 18	24	6.7	6.7	6.7
	19-34	121	33.6	33.6	40.2
	35-49	128	35.6	35.6	75.8
	50 and above	87	24.2	24.2	100
Income	1800-3800	87	24.2	24.2	24.2
	3801-5800	132	36.7	36.7	60.9
	5801-10000	107	29.7	29.7	90.6
	10001 Above	34	9.4	9.4	400
Education	Primary School	14	3.9	3.9	3.9
	Junior High School	14	3.9	3.9	7.8
	High School	68	18.9	18.9	26.7
	Undergraduate	242	67.2	67.2	93.9
	Master and Above	22	6.1	6.1	100.0

Assessment of Measurement Model

To conduct the reliability and validity assessment, we followed the two-stage analytical process suggested by well-known scholars such as (J. C. Anderson & Gerbing, 1988) and (F. Hair Jr et al., 2014). The first stage of analysis tested reliability and validity; while in the second stage of analysis, we examined the structural model to test the hypothesised relationships. PLS reliability was measured using Cronbach's alpha (Cronbach, 1951) and composite reliability (Bacon et al., 1995); while convergent validity of the measure was measured using the extracted of the average variance (AVE) to test the Both PLS reliability and validity AVE were significantly above the thresholds of 0.70 and 0.50 (see Table 3).Once the reliability and validity analyses had been conducted, the next process was to check for discriminant validity. This test has been used by (Fornell & Larcker, 1981) as described in the literature. However, many have criticised the Fornell-Larcker criterion, arguing that it is not justified to test for lack of discriminant validity in the context of general research (Henseler et al., 2015). Alternatively, Henseler et al. suggest using an alternative method to examine discriminant validity called the heterogeneity-monogeneity

(HTMT) correlation ratio. Furthermore, they demonstrated the efficacy of HTMT through a Monte Carlo simulation study. Given this powerful efficacy technique, this study also tested discriminant validity using the same method. The rule of thumb for the HTMT test is that if the HTMT value is greater than the value of 0.85 (Kline, 2011) or the value of 0.90 (Andrew H Gold et al., 2001), then there is a problem with discriminant validity. The results of the HTMT test are shown in Table 5, with values are below than the 0.85 and 0.90 requirements. Therefore, this indicates that the measurement model has sufficient validity and discriminant validity.

Table 4: Reliability and validity measures

Constructs	Number of items	CA	CR	AVE
Perceived Usefulness	3	0.852	0.910	0.771
Perceived Convenience	6	0.896	0.920	0.657
Perceived Integration	3	0.791	0.877	0.704
Perceived Enjoyment	3	0.833	0.900	0.749
Perceived Security	2	0.886	0.946	0.897
Sense of Curiosity	3	0.896	0.934	0.825
Sense of Trust	5	0.917	0.935	0.741
Satisfaction	3	0.822	0.894	0.738
Brand Image	2	0.835	0.924	0.858
Re-Purchase Intention	3	0.846	0.907	0.764
Expectation Confirmation	3	0.888	0.930	0.816

Table 5: Discriminant validity assessment (HTMT0.85)

	BI	EC	PC	PE	PI	PS	PU	RPI	S	SC	ST	BIxSC	BIxST
BI													
EC	0.178												
PC	0.275	0.220											
PE	0.304	0.298	0.301										
PI	0.127	0.228	0.428	0.407									
PS	0.060	0.095	0.062	0.251	0.121								
PU	0.270	0.327	0.421	0.266	0.37	0.171							
RPI	0.238	0.279	0.309	0.383	0.322	0.146	0.320						
S	0.250	0.524	0.585	0.596	0.630	0.297	0.555	0.768					
SC	0.083	0.104	0.065	0.033	0.107	0.19	0.112	0.086	0.091				
ST	0.113	0.049	0.130	0.085	0.199	0.048	0.044	0.098	0.084	0.049			
BIxSC	0.003	0.018	0.021	0.030	0.102	0.087	0.064	0.094	0.042	0.013	0.030		
BIxST	0.022	0.03	0.056	0.033	0.080	0.037	0.096	0.042	0.031	0.022	0.018	0.098	

Structural Model

The predictive accuracy of the conceptual model for this study was assessed using the proportion of variance (R2) (Hair et al., 2019). The R2 values for willingness to repurchase and satisfaction were 0.415 and 0.579, respectively. The structural model was analysed using a non-parametric bootstrap method with 5,000 replications (Hair et al., 2019). The results showed that perceived usefulness, perceived convenience, perceived integration, perceived enjoyment and perceived security all directly influence consumer satisfaction with IoT products. Secondly, consumer satisfaction also directly affects consumer repurchase intentions (Table 6). However, consumer psychological factors: curiosity and trust have no direct effect on consumer satisfaction. Therefore, only two hypotheses were rejected out of the nine hypotheses with direct influence (H6, H7).

Table 6: Results of structural model

Hypotheses	Relationships	Path coefficients	t values	p values	Decision
H1	PU- >S	0.165	3.312	0.001	Supported
H2	PC- >S	0.251	5.288	0.000	Supported
H3	PE- >S	0.232	5.172	0.000	Supported
H4	PI- >S	0.231	4.631	0.000	Supported
H5	PS- >S	0.129	3.341	0.001	Supported
H6	SC- >S	-0.021	0.541	0.589	Not Supported
H7	ST- >S	-0.002	0.057	0.954	Not Supported
H8	EC- >S	0.237	6.129	0.000	Supported
H9	BI*SC- > S	-0.028	0.765	0.444	Not Supported
H10	BI*ST- > S	-0.008	0.236	0.814	Not Supported
H11	S- > RPI	0.645	7.965	0.000	Supported

Table 7 represents the relationship of all indirect influences. The results show that perceived usefulness, perceived convenience, perceived integration, perceived enjoyment and perceived security all indirectly influence consumers' repurchase intention for IoT products, and therefore satisfaction has a mediating role as a mediating variable in the model. However, since there is no correlation between curiosity and trust and consumer satisfaction, the mediator variable cannot play a mediating role from the independent variable to the mediator variable and then to the dependent variable, so satisfaction as a mediator variable does not play a mediating role between curiosity, trust and consumers' willingness to purchase. Secondly, the moderator variable.

Table 7: All indirect effects

	Original sample	Sample mean	Standard deviation	T statistics	P values
PC -> S -> RPI	0.162	0.162	0.031	5.214	0.000
PE -> S -> RPI	0.149	0.149	0.03	4.920	0.000
PI -> S -> RPI	0.149	0.149	0.034	4.438	0.000
PS -> S -> RPI	0.083	0.084	0.025	3.306	0.001
PU -> S -> RPI	0.107	0.106	0.033	3.188	0.001
SC -> S -> RPI	-0.013	-0.015	0.025	0.540	0.589
ST -> S -> RPI	-0.002	-0.006	0.026	0.057	0.954
BI x SC -> S -> RPI	-0.018	-0.016	0.023	0.760	0.447
BI x ST -> S -> RPI	-0.005	-0.003	0.021	0.235	0.814
EC -> S -> RPI	0.152	0.152	0.026	5.843	0.000

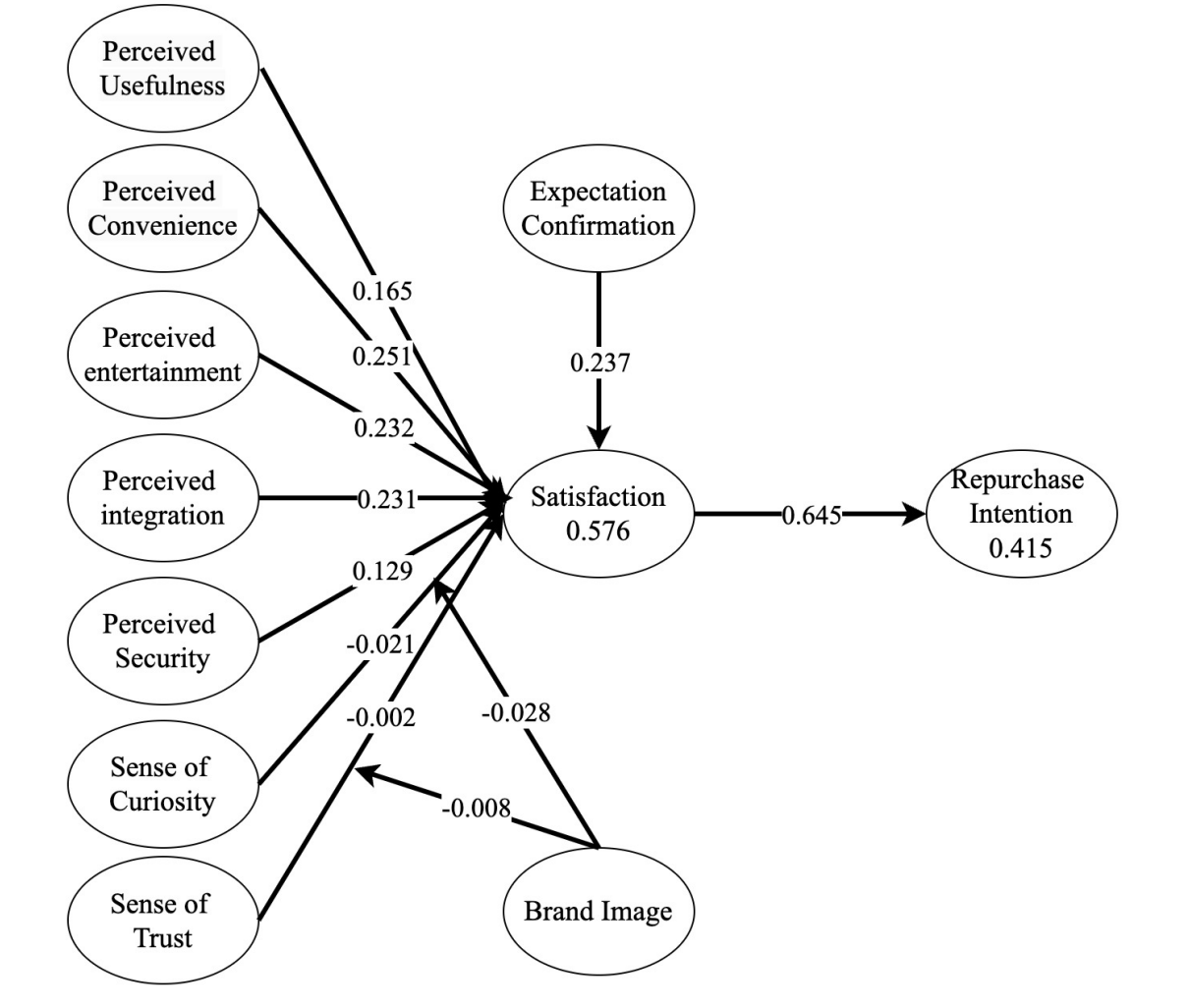

Figure 2. Structural model

Discussion

The conceptual model presented in this study extends the ECT model, and provides high explanatory value for repurchase intentions towards IoT products and IoT adoption intentions. The results indicate that perceived usefulness is a determinant of consumer satisfaction with IoT products, suggesting that perceived usefulness plays a key role in consumer satisfaction in an IoT product environment. This is in line with previous research (Park, 2020), which suggests that when users perceive an IoT product as useful or more useful, they develop a more satisfied attitude towards the IoT product. The results show that perceived convenience has a significant impact on consumer satisfaction with IoT products. This means that IoT users will assess the complexity of using IoT products. IoT users are more likely to form positive attitudes towards IoT products if they perceive that they are easy to use and provide a more convenient feel. This result is consistent with (Park, 2020). The significant positive effect of perceived enjoyment on consumer satisfaction suggests that IoT products are more likely to provide consumers with a sense of perceived enjoyment. This result is consistent with (Park, 2020). In addition, consumers' perceived level of IoT connectedness to IoT may also influence attitudes towards IoT products. And this finding that perceived integration can positively influence consumer satisfaction with IoT products was obtained in this study. This result is consistent with (Y. P. Chang et al., 2014). Finally, consumers' perceived security of IoT products is also an important factor in influencing consumer satisfaction, which is consistent with the results mentioned in the previous study by (Y. P. Chang et al., 2014). Unexpectedly, the results show that neither curiosity nor trust is a factor that influences consumer satisfaction with IoT products, which indirectly leads to the fact that the mediating and moderating variables do not play a role in these two variables.

Theoretical Contributions

First of all, generally speaking, the test object of previous researchers focuses on electronic digital devices such as mobile phones, while the test object of this paper is smart IoT products, which broadens the scope of the research and the field of the test object. For this research area, scholars at home and abroad have mainly studied from a macro perspective, such as the level of intelligence of products in the smart home market, product models and product applications, and key intelligence factors; few researchers have measured the impact of consumer perception on the re-purchase intention of smart IoT products from a micro perspective. This gap highlights the novelty of research focusing on individual consumer behaviour and preferences towards smart IoT products. Furthermore, the rapid development of IoT technology and its integration with various consumer products has created a dynamic market landscape that is quite different from that of traditional digital devices. By examining smart IoT products, this paper not only addresses an under-researched area, but is also in line with current technological advances and consumer trends. This broader scope of research enables a more comprehensive understanding of how emerging technologies affect consumer behaviour and market dynamics, providing valuable insights for academics and practitioners alike.

Second, this paper focuses on consumer psychological factors and perceived value, setting these two factors as independent variables, and enriches the research related to the impact of smart IoT products on repurchase intention by quantifying the change in repurchase intention when

consumers are confronted with new smart products. Previous studies have often neglected the subtle psychological responses of consumers when interacting with advanced technology products. This paper fills this gap by combining consumer psychology with consumer perceived value, providing a more detailed and human-centred perspective on how consumers form repeat purchase intentions. In addition, by focusing on perceived value, this study captures the complex evaluation process that consumers go through, which includes not only functional benefits but also the emotional and social value that comes with using a smart IoT product.

Finally, in the previous research literature on brand image variables, brand image was mainly used as a dependent variable and analysed as an example of traditional consumer products. In contrast, this paper takes innovative smart home products with high-tech content as test objects, and innovatively uses brand image as a moderating variable when exploring its relevance to satisfaction at the micro level from the perspective of consumer perception, and explores the role of brand image dimensions in this context. In this context, brand image is not merely the result of marketing efforts, but a dynamic factor that interacts with consumer perception and satisfaction. By positioning brand image as a moderating variable, this study reveals how a strong brand image mitigates the perceived risks associated with new technologies and enhances purchase motivation. This approach suggests that a positive brand image significantly influences consumer trust and perceived value, thereby driving repeat purchase intentions. This not only enriches the analytical research on the impact of consumer perception on companies' intention to purchase new smart products, but also expands the applied perspective of brand image research, which to some extent provides new insights for subsequent research and enlightenment for corporate brand management practices.

Implications for Practice

In an increasingly competitive market environment, smart and innovative companies must seize the initiative and find the best market position. This requires thorough market research and competitive analysis to identify unique selling propositions that differentiate their products from those of competitors. By highlighting the unique benefits and features of smart products that align with consumer values and needs, companies can more effectively position their products and attract a larger customer base. Effective communication strategies that emphasize the functional, emotional, and social value of these products can enhance consumer perceptions and drive purchase decisions. Leveraging digital marketing tools and platforms to reach and engage tech-savvy consumers can further amplify these efforts. Promoting sustainable development is another important implication of this study. Companies need to pay attention to consumer needs and develop strategies that meet current needs while anticipating future trends. This forward-looking thinking helps companies stay relevant and competitive in the long run. By recognizing the importance of consumer value perceptions, companies can design products and services that are not only innovative but also sustainable to meet consumers' growing demand for environmentally friendly and socially responsible products. In addition, companies must prioritize brand development and recognize the impact of consumer value perceptions on the repurchase intention mechanism. A strong brand image can mitigate perceived risks and enhance consumer trust, which is particularly important for new and innovative products. Investing in brand building activities and maintaining consistent brand messaging can improve brand equity and foster positive consumer perceptions. This, in turn, leads to higher repurchase rates and greater brand loyalty.

This study integrates knowledge from psychology, marketing, and other disciplines to analyze the impact of various psychological factors on repurchase intentions for smart new products. This multidisciplinary approach provides a comprehensive understanding of consumer behavior and offers insights for optimizing product features and enriching product service systems. By improving the overall consumer experience, companies can build stronger relationships with customers and encourage repeat purchases. To enhance consumer trust and promote the purchase of target products, companies should focus on optimizing product features and enriching product service systems. Continuous innovation and improvement based on consumer feedback and market trends are essential. Providing high-quality, reliable, and user-friendly products can enhance group consumer experience and foster long-term customer loyalty. In addition, providing excellent customer service and support can further enhance consumer trust and satisfaction.

Secondly, it also provides valuable guidance for the development of smart innovative enterprises and provides a scientific basis for product design, development, release, operation, and maintenance decisions. By minimizing the money and time wasted due to innovation failures and improper handling, companies can improve the efficiency and effectiveness of bringing new products to market. Understanding the importance of customer perception in the innovation process enables organizations to focus on the key concerns and preferences of the target audience, leading to more successful product launches and increased market acceptance. Finding new growth and opportunities in a rapidly changing world is key to the continued success of businesses. This study helps businesses understand consumer attitudes and needs for new smart products, allowing them to develop more optimized R&D and marketing plans. By deeply exploring consumer needs and preferences, businesses can identify untapped market segments and develop products that meet specific consumer needs. This approach can expand market share and increase profitability.

In summary, the implications of this study for practice are comprehensive and multifaceted. By focusing on increasing product repurchase intentions, developing targeted marketing strategies, adapting to market competition, promoting sustainability, and emphasizing brand development and value perception, smart and innovative businesses can achieve greater success in the dynamic and competitive smart IoT product market. Leveraging multidisciplinary insights and adopting a consumer-centric approach, businesses can optimize their product and marketing efforts, ultimately driving growth, profitability, and long-term sustainability.

Research Limitations

This study has several limitations. First, there may be other noteworthy user-oriented theories that can better explain users' willingness to repurchase IoT products. For example, the Unified Theory of Technology Acceptance and Use is considered a suitable alternative and extended user-oriented theory for understanding user behavior towards innovative and smart technologies (Adapa et al., 2018; H. H. Chang et al., 2016). Second, the research model did not take into account participant demographic information. Several previous studies have shown that users' demographic information may be significantly related to their adoption patterns of specific technologies and services (Guo et al., 2015). Therefore, future research should address the significant limitations by utilizing the results and implications of the research model proposed in this study to gain a more comprehensive understanding of users' repurchase intention for IoT products.

Conclusion

The Internet of Things (IoT) is an emerging phenomenon that is expected to affect all aspects of our lives. The aim of this study is to investigate the effects on willingness objects that influence consumers to repurchase IoT products in the context of IoT.The theoretical model proposed and tested in this paper combines ECT with perceived convenience, perceived security, perceived enjoyment and perceived integration, as well as curiosity, trust and brand image. The extended model provides a more comprehensive picture of the factors influencing repurchase intentions for IoT products. The results indicate that the construct of the expectation confirmation model has an impact on the willingness to purchase IoT products. The results also indicate that perceived usefulness, perceived convenience, perceived integration, perceived enjoyment and perceived security play an important role in influencing consumers to repurchase IoT products. This study contributes to future related literature by establishing the explanatory value of the established Extended Expectancy Confirmation Model in the context of consumer IoT.

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Appendix A

Table 8: Questionnaire constructs and items

Variable	Items
Perceived Usefulness (Park, 2020)	PU1:I think IoT devices useful for my life. PU2:Using IoT devices improves my work efficiency. PU3:Using IoT devices helps me to do many tasks conveniently.
Perceived Convenience (Yeo et al., 2017) (Cheng et al., 2021)	PC1:The IoT product is an efficient way to use the IoT product. PC2:IoT products make my life easy because I can use them anytime, anywhere. PC3:I can easily cope with various tasks with IoT products. PC4:Using IoT products saves me time. PC5:IoT products can show different modes according to my needs. PC6:The IoT product helps me to complete tasks quickly.
Perceived Integation (Chen & Chang, 2023)	PI1:Interacting with IoT products will enable me to complete tasks faster. PI2:Interacting with IoT products will make tasks easier. PI3:Interacting with IoT products will increase my efficiency.
Perceived Enjoyment (Park, 2020)	PE1:Interacting with IoT devices is fun. PE2:I enjoy using IoT devices. PE3:I have a lot of fun using IoT devices.

Perceived Security (Constantinides et al., 2010) (Cheng et al., 2021)	PS1:IoT products provide the right service. PS2:IoT products provide secure services. PS3:The IoT product maintains the privacy of personal information. PS4:The IoT product maintains records of customer usage. PS5:The IoT product protects customers' credit card or electronic payment information.
Sense of Curiosity (Koo & Ju, 2010)	SC1:I like to discover new IoT products. SC2:I like to explore IoT related products. SC3:I like using IoT products that I have never used before.
Sense of Trust (Fang et al., 2011a)	ST1:I know it is honest based on my past experience with IoT products. ST2:I know it is not speculative based on my past experience with IoT products. ST3:Based on my past experience with IoT products, I know it keeps its promises to customers. ST4:Based on my past experience with IoT products, I know it is trustworthy. ST5:Based on my past experience with IoT products, I know it is capable of getting the job done.
Sense of Fashion (Watchravesringkan et al., 2010)	SF1:I think IoT products are fashionable.
Satisfaction (Park, 2020)	S1:In general, I am satisfied with IoT devices. S2:The IoT devices I currently use meet my expectations. S3:I am very pleased with my experience of using IoT devices.
Brand Image (M. Hsieh & Lindridge, 2005)	BI1:The image of a good brand makes me desire to consume its IoT product BI2:The image of the brand is trusted. BI3:I feel that IoT branded products can be a pleasant experience.
Re-Purchase Intention (Fang et al., 2011b)	PI1: I would like to continue to purchase IoT products if I can. PI2: I am likely to continue buying IoT products in the future. PI3: I intend to continue to buy and use IoT products in the future.

Expectation Confirmation	(Park, 2020)	EC1: My experience of using IoT devices has been better than I expected. EC2: The functionality of the IoT device was better than I anticipated. EC3: Overall, most of my expectations about using IoT devices have been confirmed.