

-RESEARCH ARTICLE-

## THE INFLUENCE OF ONLINE GAME GOODS CHARACTERISTICS ON USERS' PURCHASE INTENTION

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### —Abstract—

Freemium-based MMORPGs increasingly depend on the sale of virtual items as a primary source of revenue and a means of sustaining player involvement. Despite this trend, limited scholarly attention has been devoted to understanding how distinct attributes of these items influence players' perceptions of value and their intentions to purchase. This study explores the effects of four item characteristics, namely advancement, competition, interactivity, and customisation, on perceived value, and subsequently examines how perceived value shapes players' purchasing intentions. In addition, the research investigates whether product scarcity moderates the relationship between perceived value and purchase intention by reinforcing the strength of this association. Drawing on survey data from 368 active players of Tianya Mingyue Dao, a widely played Chinese open-world MMORPG, the findings demonstrate that all four attributes significantly contribute to perceived value. Perceived value, in turn, exerts a positive effect on purchase intention. Furthermore, perceived scarcity is shown to significantly moderate this link, heightening the transformation of perceived value into behavioural intention. The study advances the literature on virtual consumption by offering a more nuanced understanding of value creation within game-based economies and provides practical implications for scarcity-oriented design strategies in digital marketplaces.

**Keywords:** Virtual Goods, Item Characteristics, Perceived Value, Product Scarcity, Purchase Intention

### INTRODUCTION

The rapid expansion of the online gaming industry continues to reshape the ways in

Citation (APA): Shen, M. (2025). The Influence of Online Game Goods Characteristics on Users' Purchase Intention. *International Journal of eBusiness and eGovernment Studies*, 17(1), 114-138. doi:10.34109/ijepeg.2025170106

which players engage with digital entertainment. According to [Newzoo \(2024\)](#), the global gaming sector is projected to reach revenues of 187.7 billion USD in 2024, reflecting a 2.1 percent annual growth rate, with in-game expenditure, including the purchase of virtual items, constituting a substantial proportion of this growth. Mobile games alone are expected to contribute up to 92.6 billion USD, accounting for 48 percent of the total. Within this evolving environment, monetisation strategies centred on the sale of virtual goods have emerged as the dominant business model, enabling developers to move beyond one-time transactions and instead generate recurring income through continuous interactions between players and games.

Virtual items in online games are generally divided into two categories: functional and ornamental. Functional goods, such as weapons, equipment, and upgrade materials, provide tangible benefits by enabling progress or competitive advantage. In contrast, ornamental items, such as skins, pets or mounts, and special effects, do not directly influence gameplay but allow players to personalise their experience and express themselves aesthetically ([Zhao et al., 2024](#)). Given the economic significance of in-game purchases for developers, understanding the psychological and structural factors that drive these decisions has become an important focus of contemporary game research.

The growing popularity of in-game purchases raises a central question: why are players willing to spend money on virtual goods that often lack material utility? As noted by [Rita et al. \(2024\)](#), players purchase both functional goods, such as weapons, armour, and skill boosters, and ornamental goods, such as costumes, skins, and visual effects. Designing virtual goods that effectively stimulate player spending presents an ongoing challenge for developers, particularly as virtual item sales now represent a critical revenue stream in the gaming industry. Prior research indicates that perceived value plays a decisive role in shaping consumer behaviour ([Mkedder & Özata, 2024](#)). Perceived value reflects a player's overall judgement of an item's worth, which may derive from its practical use or its aesthetic appeal. Moreover, scarcity can further influence the value players attribute to goods, as limited or rare items are often regarded as more desirable ([Cengiz & Şenel, 2024](#)). Scarcity-based marketing has therefore become increasingly common in online games, with time-limited events and exclusive releases designed to boost demand and trigger impulsive spending ([Khairunnisa & Evanita, 2024](#)). Nevertheless, existing studies have focused primarily on monetisation strategies and gameplay mechanics, with limited attention given to the extent to which scarcity enhances perceived value and thereby shapes purchasing intentions. As scarcity-driven sales tactics become more widespread, further investigation into their behavioural and psychological impact is required.

The sale of virtual goods has become a central mechanism of revenue generation in online gaming, moving beyond conventional pay-to-play approaches. Unlike traditional

single-player games that provide a fixed set of content, online games maintain dynamic marketplaces where players can obtain items to enrich their gaming experiences. Initially, purchases were largely confined to functional goods, such as in-game currency, weapons, and armour, which provide measurable advantages. However, the increasing appeal of customisation and social interaction has led to a surge in demand for ornamental goods, including exclusive skins, costumes, and visual enhancements (Agustin & Samuel, 2024). Examples such as limited-edition skins in League of Legends or exclusive seasonal weapons in Call of Duty: Warzone highlight the effectiveness of scarcity-driven marketing in encouraging greater expenditure. Despite this, there remains a lack of empirical work examining how scarcity elevates perceived value and consequently drives purchase intentions. Given the growing reliance on scarcity in virtual marketplaces, greater clarity on its influence on consumer behaviour is needed.

Two significant research gaps underpin this study. The first relates to the limited attention given to the ways in which virtual item characteristics influence perceived value and subsequent purchase intention. Much of the literature on in-game consumption has concentrated on mechanics, pricing models, or player motivations, rather than on the inherent attributes of the goods themselves (Cao & Xu, 2024; Çetiner & Çalışkan, 2025). Although functional and ornamental goods demonstrably affect performance, personalisation, and self-expression, the mechanisms through which these features shape perceived value remain underexplored. Moreover, developers are increasingly exploiting scarcity-based marketing strategies, such as exclusive releases and time-limited offers (Fukuda et al., 2024), yet the interplay between scarcity and perceived value in predicting purchase intention has not been comprehensively studied.

The second research gap concerns the moderating effect of scarcity on the relationship between perceived value and purchase intention. Scarcity is widely recognised as a psychological mechanism that enhances perceived value by creating a sense of exclusivity or urgency (Chang et al., 2024). Earlier studies confirm that scarcity increases consumer appeal (Wu et al., 2021), but its role in virtual consumption remains insufficiently addressed. It is particularly unclear whether scarcity has an equivalent influence on functional and ornamental goods, given that they serve distinct purposes within the gaming context. As scarcity-driven monetisation strategies become more prevalent, it is crucial to investigate their effect on how players assess value and their willingness to pay.

In order to address these research gaps, the present study examines the extent to which the features of virtual items influence perceived value and, in turn, purchasing intentions, while also evaluating the moderating role of scarcity in this relationship. This research contributes to the literature in several key ways. Firstly, it provides theoretical insights into the impact of both functional and ornamental items on perceived value and

purchase behaviour (Mkedder & Özata, 2024), thereby advancing understanding of digital consumption (Rita et al., 2024). Secondly, it extends research on scarcity by exploring how it moderates the relationship between perceived value and purchase intention in virtual markets (Agustin & Samuel, 2024). While earlier studies have demonstrated scarcity's impact on traditional consumer goods (Cengiz & Şenel, 2024), limited work has explored its effects in digital contexts. Finally, this study offers practical implications for the gaming industry, assisting developers in optimising scarcity-based marketing strategies to stimulate demand and sustain player engagement (Wu et al., 2021).

## LITERATURE REVIEW

Previous studies suggest that players' willingness to purchase virtual goods is shaped by a perceived cost–benefit evaluation (Syahrivar et al., 2021; Yu & Huang, 2022). Scholars have examined the trade-offs users make when deciding whether to spend money on online games or continue playing at no cost (Klézl & Kelly, 2023; Laurence et al., 2023). On the benefit side, performance enhancement, opportunities for self-expression, aesthetic enjoyment, and social recognition are regarded as positive outcomes of acquiring virtual goods (Fahrizal et al., 2023; Wang et al., 2022). Functional goods are often purchased by players seeking competitive advantages, faster progression, or the ability to complete challenging tasks, whereas ornamental goods are primarily chosen for character customisation and visual appeal (Kalyvaki et al., 2023; Oktaviansyah & Tutiasri, 2023). Conversely, players must also evaluate perceived costs, such as the financial burden, the risk of regret if the utility proves low, and the possibility that the item may lose relevance or uniqueness over time (Roy & Ortiz, 2023).

Research on virtual goods design has highlighted that alignment between item attributes and the psychological needs of players can substantially increase purchasing likelihood (Yang et al., 2023; Zhao et al., 2024). The perceived value of virtual items is strongly shaped by how well their features correspond with player motivations and the overall gameplay experience (Suardana et al., 2024). Functional goods that facilitate combat performance or enable faster progression tend to appeal to players who are competition-oriented or efficiency-driven, while ornamental goods fulfil self-expressive and aesthetic preferences. For developers, creating items with distinct affordances that clearly align with player intentions is recommended, as this reinforces perceptions of high value and supports positive purchasing decisions (Rodrigues et al., 2022). Emotional gratification and purchase behaviour are influenced by whether virtual items are regarded as meaningful and integrated within the game experience, suggesting that the relationship between item characteristics and player motivation is central to determining perceived value and in-game purchase patterns.

Recent studies also emphasise the critical role of scarcity in influencing consumer behaviour towards virtual goods, particularly its potential to increase both actual and perceived value while accelerating decision-making (Hao & Huang, 2025). Scarcity cues can heighten urgency and emotional engagement, facilitating the translation of perceived value into purchase intention (Agustin & Samuel, 2024). Rare items are therefore viewed as especially rewarding, both symbolically and functionally, with their perceived uniqueness often linked to exceptional and memorable experiences (Park et al., 2020).

In conclusion, prior research has primarily investigated motivations for purchasing virtual goods by focusing on psychological traits, perceived enjoyment, or price sensitivity, and has considered the transition of players from non-paying to paying under freemium models (El-Okah et al., 2023; Ladhari et al., 2020; Yokomitsu et al., 2021). While individual differences and value perceptions are recognised as important determinants of willingness to pay, little research has examined how the specific features of functional and ornamental goods distinctly shape perceived value and subsequent purchase intention. Furthermore, although previous studies confirm that scarcity can heighten desirability and perceived exclusivity, its moderating role in the link between perceived value and purchase intention in virtual contexts remains underexplored (Wu et al., 2021). To address this gap, the present study integrates perspectives on item attributes, perceived value, and scarcity, with the aim of clarifying how virtual item characteristics influence perceived value and whether scarcity strengthens this effect, thereby encouraging players' intentions to purchase in-game goods.

## **THEORETICAL BACKGROUND AND RESEARCH MODEL**

### **Theoretical Foundation**

Perceived value (PV) refers to a consumer's overall judgement of a product's utility, derived from the balance between benefits obtained and costs incurred. The concept of PV is grounded in three key principles: its inherently subjective nature, the evaluation of trade-offs between benefits and sacrifices, and the influence of contextual factors on consumption (Mkedder & Özata, 2024). Generally, PV is positively linked with consumer outcomes such as satisfaction, brand loyalty, and purchase intention (Widhiyanti et al., 2022). While previous studies have examined consumer reactions to product value, the underlying determinants and intensity of PV often differ across various consumption contexts (Ayalew & Zewdie, 2022). Traditional utilitarian perspectives tend to emphasise tangible outcomes, frequently neglecting symbolic, emotional, and experiential dimensions. In contrast, the evaluation of virtual products, particularly within online environments, incorporates a broader range of psychological benefits, which are especially prominent in hedonic contexts like online gaming. In this

sense, PV becomes a crucial explanatory construct for understanding consumer willingness to invest in non-essential digital items within immersive entertainment platforms such as massively multiplayer online role-playing games (MMORPGs) (Samudera et al., 2024).

Bano et al. (2024) highlighted that MMORPGs, including Tianya Mingyue Dao, are characterised by intricate item systems and socially interactive environments that enable dynamic assessment and exchange of value. Unlike physical products or essential digital tools, cosmetic and decorative items in these games prioritise self-expression and hedonic gratification, thereby reinforcing the importance of PV as a mechanism to explain purchasing behaviour (Ghazali et al., 2023). Consequently, PV provides a comprehensive and adaptable framework to capture the varied motivations that drive in-game purchases, particularly within hedonic and identity-based platforms like MMORPGs (Chen et al., 2024). Although PV has been widely treated as a multidimensional construct in the literature (Wang et al., 2021), some recent contributions have adopted a unidimensional perspective, often depending on the objectives and scope of the study (Mkedder & Özata, 2024). For instance, when assessing the overall utility of symbolic or experiential goods, a global estimation of value may offer greater parsimony and statistical clarity.

Scarcity, regarded as one of the fundamental principles of persuasion, has gained substantial recognition for its ability to elevate consumer perceptions of value by increasing desirability and urgency (Agustin & Samuel, 2024). Within the realm of online games, designers employ scarcity-based strategies such as limited releases, countdown deals, and low probability drop rates to attract attention and accelerate user decisions (Hao & Huang, 2025). According to (Çetiner & Çalışkan, 2025), scarce items tend to be appraised more highly not only because they confer a sense of uniqueness but also because they trigger the fear of missing out (FOMO), which heightens emotional intensity and prompts behavioural responses. Empirical findings further indicate that scarcity significantly enhances the perceived worth of non-functional virtual products such as skins, costumes, and decorative assets (Hao & Huang, 2025). Thus, scarcity operates as a symbolic and emotional enhancer of value in hedonic gaming environments and should be regarded as a key antecedent of PV in virtual consumption.

## Research Model

### Advancement and Perceived Value

Within the scope of this study, advancement-oriented virtual goods are conceptualised as functional items that support player progression, facilitate the acquisition of rare equipment, and simplify task completion. Previous studies have shown that such items

are regarded as performance enhancers, particularly by players with competitive or goal-directed orientations (Utami et al., 2023). Functional items such as experience boosters and upgrade materials reduce gameplay barriers and correspond with motivational behaviours associated with advancement (Luo et al., 2023). In MMORPGs, these goods accelerate resource accumulation and grant players access to more advanced content, thereby increasing the perceived balance between effort and reward. When players recognise that these items yield tangible benefits, such as improved success rates or faster progression, they tend to perceive the purchases as more valuable. Furthermore, when these functional features are aligned with in-game objectives, the subjective value assigned to items by players is strengthened (Cavioni et al., 2024). Accordingly, the following hypothesis is proposed:

**H1:** *Advancement-oriented characteristics of virtual goods positively influence players' perceived value in MMORPGs.*

### **Competition and Perceived Value**

Previous research indicates that the attributes of virtual goods play an important role in shaping consumers' perceived value within digital contexts. Competition-oriented items, which grant players tactical benefits in combat or player-versus-player (PvP) settings, are frequently regarded as essential tools for achieving success. Players often assess the worth of these goods according to their ability to enhance in-game performance and reinforce social dominance. Beyond fulfilling practical functions, such items also facilitate status expression and personal enhancement, particularly for players motivated by achievement (Utami et al., 2023). In expansive MMORPGs such as *Tianya Mingyue Dao*, where PvP systems and ranking structures exert continuous competitive pressure, players tend to consider competition-related goods as highly valuable assets that advance both strategic performance and social comparison. On this basis, the following hypothesis is presented:

**H2:** *Competition-based virtual goods positively influence players' perceived value in MMORPGs.*

### **Interactivity and Perceived Value**

In this study, interactivity refers to the extent to which virtual items enable reciprocal, real-time communication among players within the gaming environment (İskender, 2023). Previous research has conceptualised interactivity either as a technical feature of system design or as a subjective experience of the player (Haryadi, 2023). The technical perspective highlights elements such as response speed and message exchange, whereas the experiential view centres on psychological perceptions of engagement and reciprocity (Bulygin & Musabirov, 2020). Evidence from prior studies indicates that greater interactivity can enhance perceived value by increasing immersion and responsiveness. Within this study, interactivity is regarded both as a structural attribute

of virtual goods and as a perceptual factor influencing how players evaluate value. Compared with static or passive items, highly interactive goods provide players with a more dynamic and engaging sense of control, relevance, and responsiveness, thereby strengthening value perception (Martucci et al., 2023). Accordingly, the following hypothesis is proposed:

**H3:** *Interactivity of virtual goods positively influences players' perceived value in MMORPGs.*

### **Customization and Perceived Value**

Within the framework of consumer value theory and personalisation research, customisation is understood as the extent to which users are able to adapt a product or service in accordance with their own preferences and needs. It is strongly linked to notions of individual autonomy, symbolic significance, and the alignment between user and product (Martucci et al., 2023). By allowing such adjustments, customisation not only supports functional adaptability but also provides emotional fulfilment, self-expression, and identity construction, particularly in hedonic and digital environments such as online games (Bostan & Şengün, 2023). Prior studies demonstrate that the more extensively users are able to customise digital goods, the more value they are likely to attribute to their consumption of these items (Tuzzahra & Edastama, 2024). Further evidence suggests that enabling players to design or select personalised in-game objects encourages them to ascribe greater subjective utility to these goods and to develop a deeper psychological attachment to them (Kalyvaki et al., 2023). Accordingly, customisation can be considered a critical factor shaping the perceived value of digital items. Therefore, the following hypothesis is proposed:

**H4:** *Customization of virtual goods positively influences players' perceived value in MMORPGs.*

### **Perceived Value and Purchase Intention**

PV is widely recognised as a central determinant of consumer behavioural intentions across both offline and online contexts (Mkedder & Özata, 2024). Conceptually, PV represents a consumer-driven evaluation system in which the perceived benefits are weighed against the associated costs, incorporating both practical utility and hedonic gratification. Substantial empirical findings confirm that PV is a key antecedent of purchase intentions, extending its relevance to digital services and virtual goods (Widhiyanti et al., 2022). Within digital gaming environments, particularly MMORPGs, players assess the worth of virtual items not only in terms of functional utility but also in relation to symbolic significance and emotional satisfaction (Samudera et al., 2024). Items that deliver enjoyment, usefulness, or a sense of identity are judged more valuable, and such perceptions heighten players' willingness to make financial investments in them (Ayalew & Zewdie, 2022). Furthermore, the level of immersion

within MMORPG environments strengthens players' psychological engagement, thereby amplifying their subjective valuation of items and increasing their propensity to purchase (Bano et al., 2024). The interplay between item-specific characteristics and game mechanics shapes economic decision-making in online settings, offering a basis for understanding the role of PV. On this foundation, the following hypothesis is proposed:

**H5:** *Perceived value positively influences players' purchase intention in MMORPGs.*

### **Moderating Role of Product Scarcity**

Scarcity of products refers to the perception of limited availability arising from either temporal or quantitative restrictions, and it is widely applied as a strategy to stimulate consumer desire and prompt purchasing behaviour (Agustin & Samuel, 2024). In digital marketplaces, scarcity is commonly created through limited-time promotions, exclusive editions, or restricted-supply announcements, which intensify appeal by generating urgency and enhancing perceived desirability (Razali et al., 2021). Within MMORPGs, scarcity can be intentionally introduced by designing rare virtual items or special goods, thereby encouraging quicker purchase decisions. According to commodity theory, products with restricted availability are perceived as more valuable due to their scarcity, which increases the perceived benefits of ownership (Brock, 1968). Empirical research has further indicated that scarcity cues may heighten the influence of perceived value on purchase intention by evoking emotional urgency and amplifying loss aversion. The notion of fear of missing out (FOMO) illustrates this process, as the anticipated regret of unavailability links value judgements with purchasing actions when players perceive an item as rare or difficult to acquire (Çetiner & Çalışkan, 2025). In the context of virtual goods, players who already ascribe high value to an item may be further motivated to purchase when its limited supply becomes apparent. Consequently, perceived scarcity operates as a moderating factor by strengthening the pathway from perceived value to behavioural intention. This effect is particularly evident in MMORPGs, where limited-edition items function as symbols of social standing and strategic advantage within the player community (Hao & Huang, 2025). Therefore, the following hypothesis is proposed:

**H6:** *Product scarcity positively moderates the relationship between perceived value and purchase intention, such that the relationship is stronger when scarcity is high.*

## **METHODOLOGY**

### **Measures**

All variables in this study were operationalised through established multi-item scales, each evaluated using a five-point Likert scale (1 = strongly disagree to 5 = strongly

agree). The items were adapted from previously validated instruments and carefully modified to suit the MMORPG context, as outlined in Appendix A. Advancement and competition were assessed using adapted scales that captured both the functional and competitive dimensions of virtual goods, emphasising their role in enhancing player performance and conferring strategic advantages. Measures for interactivity and customisation were drawn from (Lin et al., 2024), focusing on participants' perceptions of reciprocal engagement, aesthetic appeal, and the extent to which virtual goods enable self-expression. Perceived value was treated as a single-dimensional construct, encompassing both utilitarian benefits and symbolic significance, with measurement items adapted from (Mkedder & Özata, 2024). Purchase intention was gauged through three items adapted from (Lin et al., 2024), reflecting players' willingness and likelihood to invest financially in virtual items. The moderating construct, perceived scarcity of virtual goods, was measured using a revised scale based on (Hao & Huang, 2025), which assessed players' perception of the rarity and exclusivity of such items.

To ensure linguistic and semantic accuracy, all scales originally in English underwent a rigorous back-translation process into Chinese. Two bilingual scholars independently carried out the translation and back-translation, and discrepancies were reconciled through expert review. A pilot study was subsequently conducted with 40 experienced MMORPG players to evaluate clarity, contextual alignment, and the internal coherence of the revised scales. Minor modifications were made following participant feedback, particularly to match wording with gaming terminology. The results indicated strong internal consistency across all constructs (Cronbach's  $\alpha > 0.80$ ), confirming their reliability for the main data collection.

## Data Collection

To evaluate the research model, a survey was conducted among players of the MMORPG Tianya Mingyue Dao, a popular open-world online game in China. This platform was chosen because of its high player engagement, advanced item system, and developed in-game economy, which made it a suitable context for examining the characteristics of virtual items and players' purchasing behaviour. The survey distribution followed a two-stage approach. First, the questionnaire was shared in two active Tianya Mingyue Dao player QQ groups, one centred on guild coordination and the other on dungeon-related combat. Second, the survey link was posted in multiple MMORPG forums and community groups where discussions on virtual goods were common. This strategy ensured access to a participant pool with substantial gaming experience and strong familiarity with in-game items.

The survey was administered using Wenjuanxing (www.wjx.cn), a widely recognised online platform for data collection in China. Although initial engagement was facilitated through gaming communities, the majority of responses were collected online. The

questionnaire remained open for 30 days, from 25 February 2025 to 26 March 2025, yielding 500 responses. After applying quality control checks, such as excluding participants under the age of 18, non-players of Tianya Mingyue Dao, responses completed in less than 5 minutes, and those with repetitive patterns, 368 valid responses were retained for analysis. This sample size is consistent with methodological requirements for studies employing structural equation modelling.

Completion time for the questionnaire ranged from 10 to 12 minutes, and it addressed central constructs such as item attributes, perceived value, and purchase intention. Participants were informed that the collected data would be used solely for academic purposes and that responses would remain anonymous. Eligibility criteria required respondents to be at least 18 years old, to have played Tianya Mingyue Dao within the past six months, and to possess basic knowledge of in-game items, ensuring alignment with the research population. To encourage participation, a small monetary incentive of 5 RMB was provided.

The demographic composition of the sample was diverse and reflected the general profile of MMORPG players in China. Of the valid respondents, 52.45% were male and 47.55% were female. In terms of age, the majority were between 18 and 35 years, with 39.40% aged 18–23, 25.55% aged 24–29, and 20.65% aged 30–35. Approximately 59% of participants had attained a bachelor’s degree or higher. With regard to in-game purchasing behaviour, 55.71% reported spending no more than RMB 1,000 per month on virtual goods, and 56.25% indicated making fewer than seven purchases per month (Table 1). These demographic and behavioural traits indicate that the sample largely comprised experienced and active game players, making it an appropriate basis for examining behavioural tendencies in freemium-based MMORPG contexts.

**Table 1: Demographics of the Respondents (N = 368)**

Demographic Variables	Options	Frequency	Percentage (%)
Age	18-23	145	39.40
	24-29	94	25.55
	30-35	76	20.65
	36-41	50	13.59
	More than 42	3	0.81
In-Game Spending Per Month (RMB)	0	0	0.00
	1-500	115	31.25
	501-1000	90	24.46
	1001-2000	104	28.26
	More than 2001	59	16.03
In-Game Purchase Frequency Per Month	0 Times	0	0.00
	1-3 Times	106	28.80
	4-6 Times	101	27.45
	7-9 Times	96	26.09
	10 Times or More	65	17.66

**Table 1: Demographics of the Respondents (N = 368) (Cont...)**

Demographic Variables	Options	Frequency	Percentage (%)
Daily Time Spent on Games (Hours)	Less than 0.5	49	13.32
	0.6-1	88	23.91
	1.1-2	41	11.14
	2.1-4	102	27.72
	More than 4	88	23.91
Gender	Male	193	52.45
	Female	175	47.55
Education	Senior High School and Less	45	12.23%
	Junior College	105	28.53%
	Bachelor's Degree	169	45.92%
	Master's Degree or Above	49	13.32%
Marital Status	Unmarried	166	45.11%
	Married	202	54.89%
Monthly Disposable Income (RMB)	Less than 1500	71	19.29%
	1501-3000	69	18.75%
	3001-5000	115	31.25%
	5001-10000	74	20.11%
	More than 10001	39	10.60%
Occupation	Student	107	29.07%
	Self-Employed	74	20.11%
	Enterprise Employee	103	27.99%
	Government/Public Sector Employee	46	12.50%
	Others	38	10.33%

## DATA ANALYSIS AND RESULTS

The research framework was analysed using partial least squares structural equation modelling (PLS-SEM) implemented in SmartPLS 4.0. While this method offers distinct advantages, it also presents certain limitations compared with covariance-based SEM (CB-SEM). PLS-SEM does not impose strict requirements of multivariate normality, which enhances its robustness when handling non-normal datasets or studies with small to medium sample sizes. In contrast, CB-SEM is generally employed for theory confirmation, whereas PLS-SEM is particularly advantageous for prediction and exploratory theory development, aligning with the objectives of this investigation. Furthermore, PLS-SEM demonstrates superior performance when addressing models of high complexity, particularly those comprising numerous constructs, hierarchical relationships, and moderating variables.

The study aimed to explore the associations between the attributes of virtual items and perceived value, as well as to evaluate how perceived value influences purchase intention. A further objective was to investigate whether perceived scarcity strengthens the relationship between perceived value and purchase intention. Given these aims, the

predictive orientation of the research, and the use of a moderately sized sample (N = 368), PLS-SEM was deemed the most suitable methodological approach. The analytical procedure followed two key phases. First, the measurement model was examined to determine reliability, convergent validity, and discriminant validity. Second, the structural model was assessed by considering path coefficients, R<sup>2</sup> values, effect sizes (f<sup>2</sup>), and the moderating role of scarcity, which was tested using interaction terms created within the PLS environment.

### Measurement Model

Reliability was evaluated through Cronbach’s alpha and composite reliability (CR). As reported in Table 2, all constructs achieved satisfactory reliability, with Cronbach’s alpha ranging between 0.820 and 0.887 and CR values between 0.881 and 0.914, both surpassing the minimum recommended threshold of 0.7.

**Table 2: Correlations and Psychometric Characteristics of the Constructs**

	AD	CO	CU	IN	PI	PS	PV
1.Advancement	<b>0.799</b>						
2.Competition	0.447	<b>0.845</b>					
3.Customization	0.374	0.469	<b>0.851</b>				
4.Interactivity	0.49	0.449	0.447	<b>0.824</b>			
5.Purchase Intention	0.468	0.482	0.536	0.491	<b>0.813</b>		
6.Product Scarcity	0.381	0.326	0.367	0.36	0.505	<b>0.808</b>	
7.Perceived Value	0.522	0.538	0.513	0.518	0.574	0.516	<b>0.806</b>
Mean	3.483	3.550	3.485	3.547	3.422	3.847	3.482
SD	1.071	1.109	1.107	1.044	1.129	0.960	1.080
Cronbach’s Alpha	0.887	0.865	0.874	0.84	0.871	0.866	0.82
Composite Reliability	0.914	0.909	0.913	0.894	0.907	0.904	0.881
Average Variance Extracted (AVE)	0.639	0.713	0.725	0.678	0.661	0.653	0.65

**Note:** Values on the diagonal represent the square root of the average variance extracted (AVE) for each construct. Bold values represent the square root of the AVE for each construct.

These findings confirm that the measurement model possesses adequate internal consistency reliability. Validity was assessed through content, convergent, and discriminant validity. Regarding content validity, all measurement items were derived from previously established scales and refined through a pre-test to ensure precision and contextual suitability. This process affirms that the constructs exhibit satisfactory content validity. Convergent validity was determined by evaluating the average variance extracted (AVE) and factor loadings. As indicated in Tables 2 and 3, AVE values for all constructs were above the 0.5 benchmark (ranging from 0.65 to 0.725), and all standardised item loadings exceeded 0.7. These results provide robust evidence of convergent validity.

Discriminant validity was examined using two approaches. First, the square root of each construct’s AVE was compared with its inter-construct correlations. As presented in

Table 2, the diagonal values ( $\sqrt{AVE}$ ) were consistently greater than the corresponding correlations, supporting discriminant validity. Second, cross-loadings were inspected. Table 3 shows that all items loaded more strongly on their designated constructs than on any other, with loading differences greater than the 0.1 threshold.

**Table 3: Item loadings and cross-loadings.**

		AD	CO	CU	IN	PI	PS	PV
1.Advancement	AD1	<b>0.76</b>	0.298	0.228	0.385	0.318	0.287	0.374
	AD2	<b>0.786</b>	0.369	0.29	0.365	0.387	0.32	0.41
	AD3	<b>0.816</b>	0.327	0.369	0.447	0.414	0.329	0.44
	AD4	<b>0.856</b>	0.408	0.322	0.482	0.42	0.349	0.474
	AD5	<b>0.834</b>	0.396	0.288	0.363	0.347	0.27	0.441
	AD6	<b>0.736</b>	0.341	0.288	0.287	0.352	0.266	0.346
2.Competition	CO1	0.327	<b>0.827</b>	0.397	0.406	0.398	0.3	0.396
	CO2	0.369	<b>0.787</b>	0.362	0.349	0.342	0.168	0.461
	CO3	0.418	<b>0.851</b>	0.372	0.373	0.446	0.343	0.493
	CO4	0.386	<b>0.909</b>	0.454	0.392	0.438	0.289	0.455
3.Customization	CU1	0.349	0.359	<b>0.839</b>	0.429	0.471	0.315	0.442
	CU2	0.27	0.386	<b>0.841</b>	0.332	0.401	0.307	0.394
	CU3	0.358	0.465	<b>0.875</b>	0.387	0.484	0.294	0.482
	CU4	0.288	0.379	<b>0.85</b>	0.369	0.464	0.337	0.421
4.Interactivity	IN1	0.364	0.376	0.355	<b>0.796</b>	0.397	0.308	0.397
	IN2	0.436	0.411	0.426	<b>0.885</b>	0.427	0.291	0.469
	IN3	0.366	0.313	0.295	<b>0.733</b>	0.377	0.25	0.389
	IN4	0.443	0.375	0.386	<b>0.871</b>	0.414	0.335	0.445
5.Purchase Intention	PI1	0.395	0.395	0.468	0.412	<b>0.839</b>	0.402	0.48
	PI2	0.362	0.364	0.373	0.355	<b>0.756</b>	0.409	0.442
	PI3	0.366	0.415	0.452	0.437	<b>0.823</b>	0.407	0.495
	PI4	0.373	0.401	0.458	0.39	<b>0.835</b>	0.438	0.469
	PI5	0.408	0.383	0.425	0.399	<b>0.808</b>	0.398	0.442
6.Product Scarcity	PS1	0.351	0.254	0.344	0.353	0.447	<b>0.849</b>	0.44
	PS2	0.333	0.278	0.31	0.323	0.416	<b>0.867</b>	0.445
	PS3	0.275	0.276	0.288	0.222	0.373	<b>0.742</b>	0.426
	PS4	0.287	0.278	0.285	0.274	0.379	<b>0.734</b>	0.377
	PS5	0.287	0.238	0.254	0.271	0.422	<b>0.839</b>	0.397
7.Perceived Value	PV1	0.397	0.429	0.42	0.413	0.495	0.382	<b>0.755</b>
	PV2	0.421	0.42	0.436	0.423	0.446	0.409	<b>0.829</b>
	PV3	0.406	0.447	0.382	0.418	0.436	0.429	<b>0.807</b>
	PV4	0.456	0.438	0.414	0.416	0.469	0.443	<b>0.833</b>

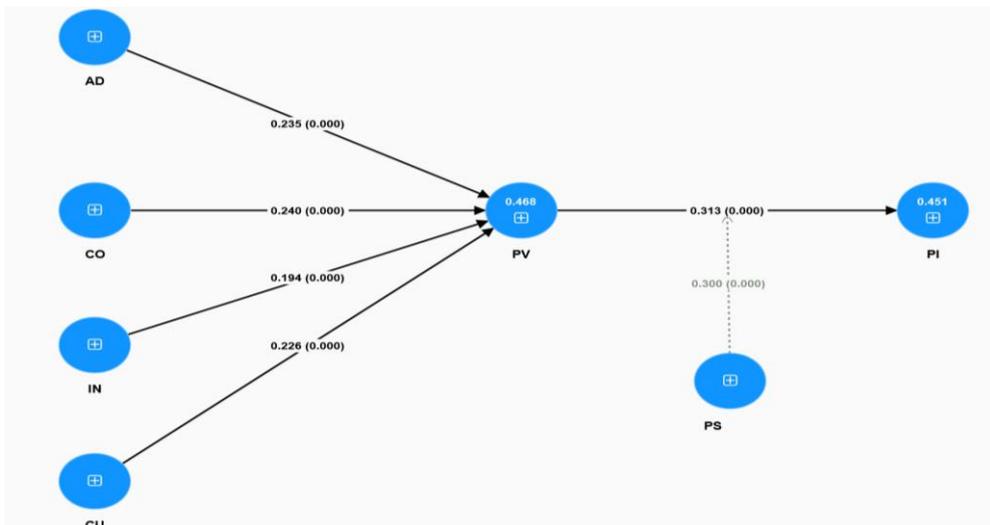
**Note:** The loadings on principle factors are all higher than 0.7. The differences between loadings on the principal factors and the other constructs are all higher than the threshold suggested for evaluating item cross-loadings in PLS results, which is 0.1. Bold values represent the item loadings for each construct.

These outcomes further confirm discriminant validity. Since the dataset was self-reported and obtained from a single source, the potential for common method bias (CMB) was considered. To address this, Harman's single-factor test was conducted. The KMO value was 0.931, indicating sampling adequacy for factor analysis. Principal

component analysis revealed that seven factors explained 68.045% of the total variance, with no single factor accounting for more than 50% (the highest was 36.326%). These results demonstrate that CMB was not a significant concern in this study.

## Structural Model

The structural model was evaluated using SmartPLS 4, and the analysis outcomes are presented in Figure 1. Path coefficients combined with bootstrapping were employed to test all primary hypotheses. The findings indicate that advancement ( $\beta = 0.235, p < 0.001$ ), competition ( $\beta = 0.240, p < 0.001$ ), customisation ( $\beta = 0.226, p < 0.001$ ), and interactivity ( $\beta = 0.194, p < 0.001$ ) exert significant positive effects on PV, thereby providing empirical support for hypotheses H1 through H4. In addition, PV demonstrated a significant predictive effect on purchase intention (PI) ( $\beta = 0.313, p < 0.001$ ), thus validating H5. The coefficient of determination ( $R^2$ ) revealed that 46.8% of the variance in PV and 45.1% of the variance in PI were explained by the proposed model, which reflects a moderate level of explanatory capacity. The moderating role of product scarcity (PS) in the relationship between PV and PI was also assessed. Results showed that the interaction effect ( $PS \times PV$ ) significantly strengthened PI ( $\beta = 0.300, p < 0.001$ ), confirming H6. This finding suggests that the impact of PV on PI is amplified when virtual items are perceived as being more limited in availability. Finally, the model fit indices further reinforced the robustness of the structural model. The standardised root mean square residual (SRMR) was recorded at 0.070, which falls below the accepted threshold of 0.08, signifying an adequate overall model fit.



**Figure 1:** Results from the PLS-SEM Analysis

**Note:** Values represent standardized path coefficients ( $\beta$ ) with p-values in parentheses. Solid arrows indicate significant relationships ( $p < 0.001$ ); dashed arrows indicate moderation effects.  $R^2$  values are shown within endogenous constructs. One-tailed tests were applied.  $N = (368)$ .

## DISCUSSION

### Major Findings

This study offers empirical evidence regarding the influence of virtual item attributes on players' perceived value and subsequent purchase intention within the MMORPG context. The findings demonstrate that features linked to advancement, competition, interactivity, and customisation significantly enhance perceived value. Advancement-oriented items improve gameplay efficiency and progression, resonating with task-driven motivations (Luo et al., 2023). Similarly, competition-related goods meet the need for social recognition and performance comparison (Utami et al., 2023). Interactive features foster communication and emotional connection, whereas customisation strengthens symbolic meaning and facilitates user–item identification (Martucci et al., 2023). In addition, perceived value was identified as a strong determinant of purchase intention, consistent with previous studies in consumer behaviour and digital commerce (Ayalew & Zewdie, 2022; Widhiyanti et al., 2022). Purchasing decisions are not solely driven by functional utility and efficiency but are also shaped by emotional appeal, symbolic significance, and social visibility (Mkedder & Özata, 2024; Samudera et al., 2024).

A further contribution of this study lies in confirming the moderating influence of perceived scarcity on the relationship between perceived value and purchase intention. The results indicate that when scarcity is perceived—such as through rare drops or limited-time items—the impact of perceived value on purchase intention is intensified. This observation supports earlier research in scarcity marketing and virtual product design (Agustin & Samuel, 2024; Razali et al., 2021). Scarcity perception activates psychological mechanisms including urgency, exclusivity, and loss aversion, which heighten players' willingness to engage in immediate purchasing (Çetiner & Çalışkan, 2025; Wu et al., 2021). In freemium MMORPGs, these mechanisms enhance the appeal of high-value virtual goods. Accordingly, this study extends the application of perceived value theory and scarcity theory to virtual consumption, demonstrating how game design elements interact with value perception when artificial limitations are introduced.

### Implications for Research

This study contributes several theoretical implications. First, it broadens the application of PV theory within the context of freemium MMORPGs. Although PV has been extensively employed to interpret consumer behaviour in both physical and digital markets (Mkedder & Özata, 2024; Samudera et al., 2024), there remains limited inquiry into how distinct item attributes influence perceptions of value in immersive gaming environments. By analysing four virtual item characteristics—advancement,

competition, interactivity, and customisation—the study demonstrates that value perceptions in games extend beyond functional utility and are also shaped by symbolic, social, and experiential dimensions (Rita et al., 2024). These insights indicate that PV theory can be effectively adapted to hedonic virtual contexts, thereby offering a more nuanced understanding of how item design informs user evaluation and behaviour.

Second, this research integrates PV theory with scarcity theory to examine the influence of limited availability on players' decision-making. While PV theory traditionally emphasises rational cost–benefit assessments, scarcity theory underscores the psychological strain that emerges from perceived limitations (Çetiner & Çalışkan, 2025). The results reveal that scarcity not only acts as a marketing tactic but also operates as a value enhancer, reinforcing the relationship between perceived value and purchase intention (Agustin & Samuel, 2024). This theoretical convergence suggests that value perceptions in digital environments are contextually dynamic, shaped by emotional responses and situational triggers, thereby enriching the understanding of consumer psychology within game-based ecosystems. Third, the findings advance knowledge of the antecedents of PV in virtual economies. While earlier studies predominantly identified price and product quality as the primary value determinants (Prakosa & Sumantika, 2022), this study highlights the greater significance of features such as customisation and interactivity in MMORPG contexts. These characteristics support symbolic self-expression and social recognition, thereby strengthening the emotional and identity-related value of in-game assets. Consequently, in hedonic digital settings, value is derived less from monetary equivalence and more from elements of narrative, personal agency, and self-presentation. This expands the theoretical scope of PV beyond the conventional cost–benefit framework.

### **Implications for Practice**

The results of this study provide valuable insights for developers and product managers operating within the freemium MMORPG market. Firstly, attention should be directed towards the way in which various features of virtual goods shape players' perceptions of value. Items that support advancement, such as upgrade materials and experience enhancers, can substantially improve gameplay efficiency and are particularly appealing to players with task-oriented motivations. Goods linked to competition strengthen players' sense of achievement and dominance in PvP contexts. Likewise, interactive items, including collaborative tools and expressive emotes, should be intentionally designed to stimulate social interaction, whereas customisation elements enable players to reinforce self-identity and symbolic presence. Developers are therefore encouraged to align item design with motivational structures, ensuring that virtual goods not only fulfil gameplay functions but also deliver emotional and social benefits that enhance perceived value.

Secondly, the study highlights the pivotal role of perceived value as a psychological mechanism connecting game design to purchase intentions. Although many users initially participate in freemium games without spending, subjective evaluations of value become decisive in shifting these individuals towards paid consumption. Practitioners should therefore focus on integrating narrative depth, visual cues, and interactive feedback that reinforce the symbolic and emotional significance of items. For instance, linking collectible goods to story-driven missions or hidden lore can heighten their perceived worth, as players associate them with enriched narrative experiences. Furthermore, combining functional attributes such as utility, rarity, and aesthetic appeal into bundled packages can provide players with a more comprehensive sense of value, thereby improving conversion from non-paying to paying users.

Thirdly, the findings confirm the importance of scarcity as a moderating factor within marketing strategies. The perception of rarity generates urgency, commonly described as FOMO, which amplifies perceived value and significantly shapes purchasing decisions. Developers can leverage this by introducing limited-time offers, seasonal events, and probabilistic item drops that reinforce exclusivity and urgency. Nevertheless, overreliance on scarcity mechanisms risks producing fatigue and dissatisfaction among players. To avoid these negative outcomes, scarcity should be carefully integrated into the broader game economy and reward systems, ensuring that premium items retain a sense of uniqueness, achievement, and social visibility.

## **LIMITATIONS AND FUTURE WORK**

This study is subject to several limitations that should be acknowledged and addressed in subsequent research. First, the reliance on self-reported questionnaires introduces the possibility of common method bias and subjective distortions in assessing constructs such as perceived value and purchase intention. Future investigations are advised to complement survey data with objective behavioural indicators, for example, actual in-game purchase or transaction records, to strengthen the validity and explanatory power of the proposed framework. Second, the study sample was restricted to Chinese players of a single open-world MMORPG, which, although enhancing ecological validity within that context, limits the generalisability of the results. Further research should broaden the scope through cross-cultural analyses and by incorporating varied game genres to determine whether the observed relationships between virtual item features, perceived value, and purchase intention are consistent across diverse cultural settings and gaming formats.

Third, the present research did not examine the role of prior gameplay experiences, particularly free trial periods, in shaping purchase decisions. Evidence from existing studies indicates that dissatisfaction or barriers encountered during trial phases may create a form of “demand through inconvenience,” which motivates players to transition

to premium content. Future research could investigate the mediating or moderating function of pre-purchase experiences in the relationship between perceived value and willingness to pay, especially within freemium game economies. Fourth, while this study incorporated four key item characteristics (advancement, competition, interactivity, and customisation), it did not differentiate between functional and non-functional virtual items in shaping perceived value. Prior research highlights that symbolic, aesthetic, and social attributes may exert stronger influence than purely utilitarian functions in digital consumption. Consequently, further work should explore how players cognitively and emotionally categorise different item types and how such classifications affect purchase motivations. Such insights would enable game developers to design items that align more effectively with players' psychological value drivers in freemium environments.

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## APPENDIX

### Measurement Scales

Variable	Item Number	Item	Reference Number
Advancement	AD1	In the game, items can accelerate my character's level progression.	
	AD2	In the game, items help me acquire rare equipment more quickly.	
	AD3	In the game, items significantly enhance my character's attributes.	
	AD4	In the game, items speed up my task completion.	
	AD5	In the game, items help me gather more material resources.	
	AD6	In the game, items improve my overall growth progress.	
Competition	CO1	In the game, items enhance my advantage in individual battles.	
	CO2	In the game, items improve my performance in team battles.	
	CO3	In the game, items help me effectively suppress enemies in competitive modes.	
	CO4	In the game, items counter opponents' battle strategies effectively.	
Interactivity	IN1	In the game, items help me interact with other users through fun emotes.	(Lin et al., 2024)
	IN2	In the game, item interaction interfaces are user-friendly.	
	IN3	In the game, interaction feedback from items feels smooth and natural.	
	IN4	In the game, interactive item experiences help me immerse in the social atmosphere.	
Customization	CU1	In the game, items allow me to freely customize character outfits to match my preferences.	
	CU2	In the game, items let me shape my ideal facial appearance for the character.	
	CU3	In the game, items help me design a uniquely styled in-game home.	
	CU4	In the game, I feel a sense of accomplishment when customizing my character's appearance.	
Perceived Value	PV1	In the game, the price of items matches the value they provide in terms of experience.	(Mkedder & Özata, 2024)
	PV2	In the game, items effectively enhance my overall gaming experience.	
	PV3	In the game, the time and effort spent to obtain items is worthwhile.	
	PV4	In the game, items generally provide good utility for me.	
Product Scarcity	PS1	In the game, limited-time items create a strong sense of purchase urgency for me.	(Hao & Huang, 2025)
	PS2	In the game, special event items available only during certain times attract me to purchase.	
	PS3	In the game, limited edition items (e.g., holiday or crossover editions) stimulate my buying desire more than	

		regular items.	
	PS4	In the game, rare items are usually difficult to obtain.	
	PS5	In the game, the rarity of some items increases their value.	
Purchase Intention	PI1	I want to try purchasing in-game items.	(Lin et al., 2024)
	PI2	I actively seek information about how to obtain newly released in-game items.	
	PI3	I am willing to recommend useful in-game items to my friends.	
	PI4	I am willing to continue purchasing more types of in-game items.	
	PI5	I plan to increase my future purchases of in-game items.	