

**AESTHETIC DESIGN AND MOTIVATION IN THE METAVERSE:  
EXPLORING SUSTAINABLE ENGAGEMENT THROUGH SELF-  
DETERMINATION THEORY**

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**Abstract**

The Metaverse is a vast digital realm of interactive virtual worlds that produce a "visually appealing" setting where user engagement and commerce are shaped by game content or aesthetical designs. This study examines the relationship between in-game buying behaviour and aesthetic design based on the Self-Determination Theory (SDT). It also examines consumers choices in metaverse influenced by social, utilitarian and hedonistic motives . The data was collected by surveying 217 metaverse gamers in Pakistan in a snowball sampling technique. SmartPLS 4 was used for structural equation modelling to test the hypothesized relationships. Aesthetic design has an enormous direct impact on in-game buying behavior. Hedonic incentives had no perceptible direct or indirect effect. Social and utilitarian motives showed some significant direct and indirect effects on purchase decisions. The findings offer theoretical knowledge to scholars as well as practical knowledge to marketers and game developers in order to create better user engagement and monetization. This paper endorses responsible revenue models in the rapidly changing digital economy by connecting monetization strategies to SDG 8 and SDG 16, encouraging ethical and sustainable business practices and encouraging responsible consumption patterns. Integrating the role of marketing and promotional strategies will make clear the meanings of interactions between external variables and player motivations. Further investigation is recommended through this study to try to examining whether contextual or moderating factors affect the relationship between motives and purchase behaviour.

**INTRODUCTION**

The Metaverse is a large-scale digital immersive universe which is made up of digital worlds and that which is an "aesthetically attractive" environment where the gamification content and aesthetics of experiential design of the Metaverse hold importance in terms of the user engagement and commercial space (Allam et. al., 2022). Its immersive quality - including stunning graphics,

thematic coherence and creative storytelling, creates a value in gameplay and inspires players (Dwivedi et al., 2022). Player engagement and purchasing behavior (Chen et al., 2024a) are changing with (Chakraborty & ĀOindrila, 2024), aesthetic designs in Metaverse. Strong emotional bonds among players and games, created by beautiful design and active participation, ensure

brand loyalty (Salem et al., 2024). Aesthetic design is detected as an important factor of engagement, affecting the acquisition of knowledge and collaboration in game based learning (Chen et al., 2024b). Many users have no problem with spending real money on visually appealing games (Hadi et al., 2024). More importantly, existing literature has highlighted aesthetic factors that had an impact on players' cognition, collaboration, and learning outcomes (Palmquist et al., 2024; Goethe et al., 2020).

Metaverse has a promising digital economy which present huge possibilities for innovations and sustainability (Dogan et al. 2024). Rising in-gaming purchases and the creation of fresh digital jobs for digital designers, developers, and creators lead to the promotion of SDG 8 - promoting full and productive employment, decent work, and inclusive economic growth. In order to create a fair and sustainable digital economy, it is crucial to recognize the importance of aesthetics in creating engagement and value for consumers and businesses. Moreover, as these virtual worlds might increase in complexity in terms of their social and economic ecosystems, the frameworks of governance and user interaction will be very crucial (Mohammed et al., 2024). The Metaverse also supports SDG 16 which encourages promotion of peaceful, inclusive societies and accountable institutions. By exploring the effect of beauty in design on player responses, this study adds value to academic knowledge and provides information for the responsible and sustainable development of the Metaverse economy (Kumar et al., 2025). Understanding design-driven user interaction is essential to the ethical development of this changing economic and social space. (Sharifi et al., 2025).

Almac and Naz (2023) describe the concept of aesthetic design as an attractive, artistic, and overall appeal of an object, web, mobile or game interface. Sun & Xiaoyi (2024) take this idea further in relation to the visual appeal of services while Tinmaz, et al. (2024) focus on the role that metaverse game worlds and their aesthetic features (design, color schemes) play in attracting players. Huo et al. (2024) pointed out that the importance of aesthetic design is visuality based on enjoyment,

while Roh et al. (2024) mentioned that wearable devices are also based on aesthetic properties including design, color theme, and material. However, according to Zhao et al. (2024a), there is a gap that needs to be filled despite this increasing awareness, which is that the power of aesthetic design in affecting both the purchase intention and the actual purchase behavior is underexplored. The dearth of empirical studies linking game design to consumer decision-making highlighted by Ghosh et al (2022) and Sharma et al (2024) calls for research studies that can unravel the process through which aesthetic design encourages willingness to buy followed by (actual) consumption. Whereas previous studies have addressed motives in reference to overall game quality, studies that separate specific motives, hedonic, utilitarian, and social, to influence player behavior in virtual worlds have emerged recently. Hedonic Motivations are these pleasures and satisfaction that are obtained from gameplay with a focus on the entertainment value as a driving force of engagement (Possler et al., 2024). Although Mo et al. (2024) and Uhm et al. (2023) have recognized the relationship between personal activity plans and enjoyment, the role of hedonic motivation in directly influencing the in-game purchasing preference is largely under-researched (Hussain et al., 2023; Hollebeek et al., 2023). The influence of hedonic motivation on the appeal of aesthetic design is important since it facilitates predicting purchase behavior. Utilitarian motivation is more focused on practical benefits acquiring of resources, advancement of levels and achievement of in-game goals (Lee & Younson, 2024). Whereas, social motivation highlights the importance of human relations and social interaction that helps in giving the gaming experience a broader meaning (Jung et al., 2024). In view of the large differences in the findings of the literature on the relationship between hedonic motivation and in-game purchases (Hollebeek et al., 2022), further research is required. Based on these, in this study the identified gaps in the research are:

- Empirical Evidence on Aesthetic Design - Few studies are direct empirical in examining the effect of aesthetic design

on purchase intention and actual purchase.

- While hedonic, utilitarian and social motivations are recognized, their unique influences on in game purchasing decisions are not well delineated.
- Integration with Gamification Strategies - Understanding of the relationship between aesthetics design and motivation within the context of gamification, as a driving force for consumer behavior is scarce.

Addressing these gaps will increase the scholar knowledge of consumer behavior in digital environments and offer actionable insights. will be helpful for the marketers and game developers which aim to raise the financial viability of the in game commodities. Motivation is crucial in gaming as explained through Self-Determination Theory, SDT (Deci & Ryan, 1985). Three SDT motivations exist: extrinsic motivation (reward-seeking), enjoyment-driven motivation, and relatedness (social affiliation). Deci et al. (2017) discussed SDT in massively multiplayer virtual environments. This study links Aesthetic Design, enticing in-game purchases, and metaverse gameplay foundations via a SDT lens. How aesthetic design impacts purchasing. The study also revealed that Metaverse game players' ability to use digital interventions and understand games influences their buying behavior. The SDT (Deci and Ryan, 1985), hedonic motivation embodies autonomy i.e. the freedom to enjoy playing, utilitarian motivation embodies competence i.e. the quest to master and to be efficient, and social motivation embodies relatedness i.e. the need to associate with other people. This research expands on SDT by experimentally projecting these three dimensions on the effect of aesthetic design in the Metaverse.

This research is necessary for various reasons. Firstly, as Waheed and Khan (2025a) has discussed impact of adapting and creative behaviors through SDT and this leads to the investigation as how visual designs impact game consumer behavior, with theoretical implications for the subject of gaming psychology. Secondly, based on the motivation theory, this research leads to the

improvement of the game motivation principles. Third, the game developers and marketers have the opportunity to use the results to make the players more interested by aesthetic designing and visualization tactics. The research advances theoretical knowledge and practical applications both in the game industry, to enhance player experiences and to contribute to digital motivation and consumer behavior research. The implications are beyond just game makers and marketers, and industry stakeholders. Metaverse players can improve engagement and profitability by taking into account aesthetic design and motivational factors that drive . First, the developers can use this data to make the in-game content and design player friendly, and thereby make more sales. Second, marketers can make their strategies stronger by adding motivating elements in advertisements and promotions. Third, the study discusses aesthetic design, motivation, and in-game purchases, which adds to the academic body and helps stakeholders make the most out of their player's experience and fine tunes motivational techniques. In the SDT (Deci and Ryan, 1985) hedonic motivation represents autonomy (the freedom to enjoy playing), utilitarian motivation represents competence (the drive to master and be efficient) and social motivation represents relatedness (the need to connect with others). This paper extends based on SDT and empirically projects these three dimensions into the impact of aesthetic design in the Metaverse.

## 2. Literature review and hypotheses development

### 2.1. Aesthetic design and in game purchase

Aesthetic Design in games encompasses the meticulous design of visual and aural components to elicit a specific mood, atmosphere, or emotion in the player. This includes art options for graphics, color palettes, design, environment, sound effects, music, and overall style (Machado et al., 2021). Similarly, the AD of a game encompasses the visual and ornamental components that influence the game's overall appearance (Alexiou et al., 2022). Additionally, aesthetic designs in the context of

free and premium game purchases are typically the visual and artistic elements that improve the appearance of in-game items, characters, environments, or other virtual assets (Temelli et al., 2023). Yang et al. (2024b) found a significant correlation between the visual appeal of Metaverse games and the likelihood of players investing in in-game items, regardless of whether they were free or premium. Furthermore, it corroborates the idea that players' propensity to make in-game purchases, whether free or premium, is positively influenced by improved aesthetic features (Wang et al., 2023). SDG 8 is also supported by the production of high-quality aesthetic design, which fosters innovation and creates excellent job opportunities for artists, designers, and game developers (Alayar et al., 2025; Waheed & Khan, 2025b). Ethical design considerations, such as avoiding exploitative practices or promoting excessive consumption through aesthetic appeal, may also align with SDG 16 by encouraging responsible business practices and fair play in the digital economy (Morshed, 2025). These studies support the idea that an appealing aesthetic design leads to a rise in both free and premium in-game purchases. Teng et al. (2024) highlight the significant rise in players' willingness to invest in virtual items and advancements inside gaming environments as a direct outcome of improved visual aspects. Similarly, Zhang et al. (2023) study backs up these claims, stressing the positive relationship between players' proclivity to make in-game purchases and visual improvement across a number of gaming platforms and genres.

**H1:** *Aesthetic Design has Positive Relationship with in game Purchase.*

## 2.2 Aesthetic Design, Hedonic Motivation and Ingame Purchase

In games, aesthetic design is essential for generating favorable feelings and increasing player satisfaction, both of which are strongly related to hedonic motivation, and the aesthetic layout of games has a superb relationship with hedonic motivation (Possler et al., 2024) and the enjoyment of playing a game can be greatly increased when its design is visually appealing

(Hollebeek et al., 2022). Furthermore, in games, aesthetic design refers to the appearance, style, and general visual appeal of a product, environment, or level (Edmonds et al., 2024, Ma et al., 2024). Therefore, when a gaming layout is aesthetically captivating, it can beautify the amusement and pleasure derived from engaging players with it, thereby increasing hedonic motivation (Qiu et al., 2024). This suggests that incorporating aesthetic factors into the gaming layout can impact individuals' motivation to interact with and derive pleasure from the game (Trammell & Hannah, 2024). The pursuit of hedonic motivation through aesthetic design, while primarily focused on player enjoyment, can indirectly contribute to SDG 8 (Decent Work and Economic Growth) by driving demand for creative content and supporting the economic viability of the gaming industry. However, it also raises questions pertinent to SDG 16 (Peace, Justice, and Strong Institutions) regarding consumer protection and responsible marketing, ensuring that hedonic appeals do not lead to problematic spending habits or manipulative design practices that undermine trust and fairness in the gaming ecosystem.

It has long been believed that the primary motivation for players' in-game consumption is hedonic (Possler et al., 2024; Tan et al., 2024). This is due to the fact that Hedonic gamers are more prone to look for opportunities to increase their gaming satisfaction and enjoyment (Hew et al., 2024). Likewise, Through access to unique content, cosmetic goods, or game-enhancing features, in-game payments frequently offer instant pleasure and can enhance the entire gaming experience (Papangeli et al., 2024; Gibson et al., 2023; Ravoniarison & Benito, 2019). As such, players who experience significant happiness from these additions are more likely to purchase in-game items to maintain or increase their enjoyment (Laffan & Derek, 2024). Thus, this suggests that the greater a player's motivation for hedonic pleasure, the more probable it is that they will spend money in-game (Hussain et al., 2024). This implies that the connection between

attractive design and in-game purchases is mediated by the hedonic drive. Players enjoy games more when there is an eye-catching design, which heightens their hedonic drive to spend money on in-game items (Xun et al., 2024a). Thus, users are more likely to make purchases to continue enjoying a visually beautiful and pleasurable gaming experience.

Hedonic motivation and in-game purchases are related because players want to feel happy, enjoy themselves, and have an immersive experience in virtual worlds (Ghazali et al., 2023). Players are motivated by hedonic incentives to pursue activities that are pleasurable and emotionally fulfilling by nature (Hussain et al., 2023a; Munir et al., 2025), which has a direct impact on their decision to buy virtual goods (Cao et al., 2024b). This blend of aesthetic design, hedonic motivations, and a flexible pricing model contributes to the dynamic and multifaceted nature of modern gaming. Hence, the relationship of aesthetic design is hypothesized to have a direct and indirect (via Hedonic Motivation) influence on in-game purchases.

**H2a:** *Aesthetic design is positively related to hedonic motivation.*

**H2b:** *Hedonic Motivation mediates the relationship between aesthetic design and in-game purchases.*

**H2c:** *Hedonic motivation is positively related to in-game purchases.*

### 2.3 Aesthetic Design, Utilitarian Motivation and In Game Purchase

Within the realm of gaming, the cultured format of recreation encompasses its visible appeal, splendor, and attractive features, whereas utilitarian motivation relates to the realistic benefits or functionalities it offers to gamers (Bihari et al., 2024). Furthermore, when gamers perceive a game to be aesthetically attractive, they are more likely to be driven by its utilitarian elements, such as its gameplay mechanics or features (Palmquist et al., 2024b). This means that a game's aesthetic layout enhances its perceived value, leading to elevated utilitarian motivation among players (Hussain et al., 2024). Gamers may be more willing to interact with and respect a sport for its

functional blessings, while its aesthetic design resonates with them (Zanescu, 2023), underscoring the importance of aesthetics in fostering participant engagement and pleasure in gaming reviews.

By encouraging innovation that improves user experience and productivity in digital contexts, an emphasis on efficiency and practical advantages is in line with SDG. Efficiency could be attributed, for example, to in-game purchases that provide time savings or competitive advantages to players. According to SDG 16, it is essential to guarantee fairness and transparency in the presentation and sale of utilitarian advantages to stop dishonest business practices and preserve confidence in the online marketplace. Clear communication of the value proposition of such purchases is part of this.

Utilitarian Motivation refers to the practical or functional reasons that drive individuals to make decisions (Ponsignon et al., 2024). In the realm of gaming, this motivation could be associated with the perceived benefits or advantages gained through in-game purchases, such as enhanced gameplay, progression, and competitive advantages (Munir, 2025; Marder et al., 2019). The positive mediation indicates that Utilitarian Motivation acts as a catalyst, enhancing the relationship between Aesthetic Design and in-game purchases, emphasizing the practical benefits gained from the aesthetic aspects of the game (Salem et al., 2024). This connection underscores the complex dynamics shaping players' preferences and purchasing behaviors within the gaming ecosystem (Skinner et al., 2022). In simpler terms, this implies that when players are motivated by utilitarian factors (practical or functional benefits) and find the game's aesthetic design appealing (Palmquist et al., 2024a), it contributes to an increased tendency to make in-game purchases. Players with High Utilitarian Motivation are more inclined to buy in-game items because they believe these purchases will improve their overall gaming experience and efficiency (Dulko & Diana, 2024; Shams et al., 2021; Sun et al., 2024). Additionally, these players place a high value on the benefits and utility that result from

such investments, such as the capacity to obtain essential components (Wang et al., 2024) that make games simpler, time savings, or competitive advantages (Liu et al., 2013). As a result, players who are utilitarian in nature value in-game purchases that have real-world applications above those that are only decorative or motivated by prestige; hence, the greater a player's utilitarian motivation, the more they will spend money in-game. Aesthetic Design, in the context of gaming, pertains to the visual and sensory components of a game, encompassing elements such as graphics, art style, and overall aesthetics (Bao et al., 2024). Aesthetic Design refers to the visual and sensory aspects of a game, encompassing elements such as graphics, art style, and overall aesthetics. In the context of in-game purchases, which can be either free or premium, Utilitarian Motivation plays a crucial role in consumption (Holbrook et al., 1982). Furthermore, Utilitarian motivation needs to be considered in the context of in-game purchases (Zhao et al., 2024c). It is hypothesized that

**H3a:** *Aesthetic design is positively related to utilitarian motivation.*

**H3b:** *Utilitarian Motivation mediates the relationship between aesthetic design and in-game purchases.*

**H3c:** *Utilitarian motivation is positively related to in-game purchases.*

#### **2.4 Aesthetic Design, Social Motivation and In Game Purchase**

An aesthetic layout plays a pivotal role in driving social motivation. While environments, merchandise, and reviews are aesthetically fascinating (Stiegemeier et al., 2024), they tend to attract interest and elicit positive feelings from people (Zhao and Fan, 2024). This enchantment can spark social interactions, as humans are drawn to share their appreciation or speak of the splendor they understand (Strohmayr et al., 2024). Moreover, aesthetic layouts often communicate cultural values or societal norms, serving as a diffused but influential medium for social connection and identification expression (Tang & Grace, 2024). Hence. The interaction between aesthetic

design and social motivation is crucial for creating environments and products that foster significant social connections and engagement (Ghai & Akanksha, 2024). Aligning this with the SDGS, the concepts of aesthetic design in virtual worlds may influence and motivate the design of public areas in the real world. Additionally, as players develop relationships and possibly plan offline events, the social ties promoted by visually appealing virtual worlds can strengthen real-world communities (Mahalakshmi et al., 2024). However, it is also crucial to consider whether spending too much time on virtual aesthetic experiences detracts from participating in local community development.

Previous studies have shown that players with a strong social drive are more likely to make in-game purchases (Cao et al., 2024). Likewise, Gamers are motivated to spend money on virtual goods and services by social considerations, such as the need for social approval, the need to compete with friends, and the desire to gain status among peers (Kaminsky & Cale, 2023). In particular, in-game purchases are more common among players motivated by social factors, such as the need to outdo peers, obtain attention from others, or elevate their standing in the gaming community (Kuklenko & Polina, 2024). The perceived worth of social capital that these expenditures offer, such as special equipment, skills, or cosmetics that improve their gaming experience and visibility among peers, may be used to explain this behavior (Ngah et al., 2024). Therefore, the greater a player's Social Motivations, the more likely they are to spend money on the game to fulfil their social objectives. Gamers who are driven by Social Motivations may be more likely to spend money on in-game items that raise their status or encourage social interactions.

Hussain et al. (2024) proposed that in metaverse games, the relationship between appealing design and in-game purchases might be mediated by social motivation. In particular, visually appealing in-game objects (such as environments, avatars, and skins) boost players' social motivation, such as their desire for status, group membership, and

social recognition (Poeller et al., 2024), which raises the possibility that they may make in-game purchases. The relationship between aesthetic design and social motivation is further supported by the fact that players frequently search for visually unique goods to satisfy their desire for social recognition and status within the game community (Hennig-Thurau et al., 2023). As a result of this social drive, gamers make more purchases in the game. Hence Social motivation mediates the relationship among aesthetic design and in-game purchase. Furthermore, Social motivations have been identified as the primary driver of the acquisition of in-game items and virtual goods (Ma et al., 2024). Numerous studies have explored the correlation between various social factors, such as social value (Yang et al., 2024a), self-presentation (Stefanczyk et al., 2024) social influence (Gong et al., 2023) and social presence (Konya-Baumbach et al., 2023), however status free and premium in-game purchases still to needs be explored (Zhao et al., 2024b). The most important incentive is the

social aspect of playing with friends and other people, which is required for buying free and premium in-game items (Shein et al., 2024). Players are driven by the desire for social enhancement, which may manifest in demonstrating authority over others, reinforcing team identity, or setting themselves apart from the rest (Xun et al., 2024b). Items may also be acquired with the intention of gifting them to other players (Kyriakou & Martha, 2024) Individuals experiencing social expectations to actively participate in a gaming community might end up making additional expenditures on in-game purchases, both free and premium (Pham et al., 2024). Thus, it is hypothesized that:

**H4a:** *Aesthetic Design has Positive Relationship with Social Motivation.*

**H4b:** *Social motivation mediates the relationship among aesthetic design and in-game purchase.*

**H4c:** *Social Motivation has Positive Relationship with In game purchase.*

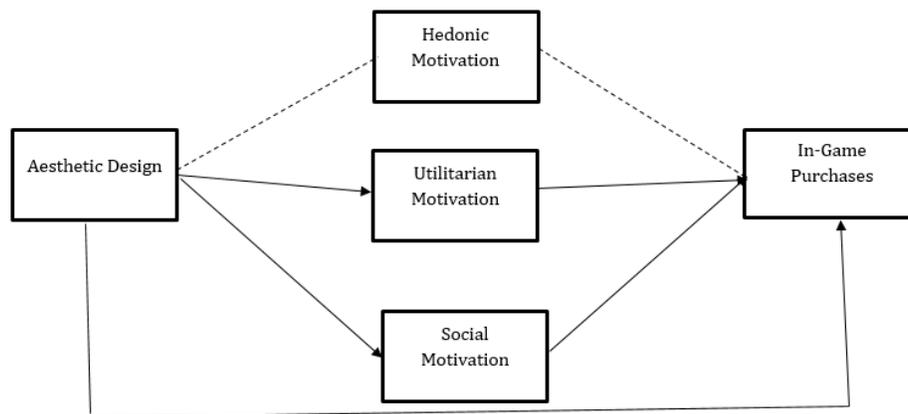


Figure 1. Research Framework

The model suggests that Aesthetic Design is the visual and sensory attraction of a game environment, game characters, and interface, which ultimately has an effect on motivational factors of players that then influence their In-Game Purchase Behavior. It is based on Self-Determination Theory (SDT) that describes the

effect of intrinsic (hedonic and social) and extrinsic (utilitarian) motivation on behavior. Aesthetic Design satisfies the intrinsic psychological needs (autonomy, competence, relatedness) by increasing the enjoyment, usefulness and social connectedness, thereby encouraging players to make continued investments and purchases.

### 3. Research Methodology

#### 3.1 Sample and Data Collection Procedure

The relationships among the constructs were deduced using a positivistic approach. Sample and Data Collection Procedure. This study employed a non-probability sampling technique, specifically snowball sampling, as gamers know other gamers. The study employed snowball sampling to focus on a specific group of metaverse game users in Pakistan. The logic behind this strategy is that gamers know who other gamers are, making it effective in reaching the intended population; it takes advantage of the target population's existing social networks, allowing researchers to reach out to a hidden or specialized group that would otherwise be difficult to discover and interact with. Data were collected using an online survey. Data were collected from Metaverse game players in Pakistan. The sample size was calculated using the G\*Power formula. The G\*Power calculator was used to determine the sample size. The effect size was 0.05, and the required power was 0.90. Five arrows pointed towards the

endogenous construct was 5. The minimum sample size required for this study was 116 participants. Hence, this study considered collecting more than 150 data points. This method of calculating sample size has gained importance recently (Muhammad, 2020). This study considered a sample size of 217. Of the 250 surveys, 217 complete surveys were obtained, and 33 were discarded because of incomplete information. Thus, the usable response rate was 86.8%. The participants' demographics are shown in Table 1. Of the 217 game players who completed the surveys, 73% were male and 27% were female. The participants' demographics are shown in Table 1. Of the 217 game players who completed the surveys, 73% were male and 27% were female (Hussain & Zahid, 2024). Moreover, 62% were between 21-25 years of age, and 36% were above 30 years of age. Furthermore, 43% had an income below 10,000, and a maximum of 58% were students.

Table 1. Demographics Characteristics n=217

Demographics	Categories	Frequency	Percentage (%)
Gender	Male	158	72.8
	Female	59	27.2
Age	21-25	136	62.7
	26-30	2	0.9
	>30	79	36.4
Income	<10,000	94	43.3
	10,000-20,000	25	11.5
	20,001-30,000	13	6.0
	40,001-50,000	61	28.1
	50,001-60,000	14	6.5
	60,001-70,000	10	4.6
Employment Status	Student	127	58.5
	Full-time employee	72	33.2
	Self-employed	12	5.5
	Unemployed	5	2.3
	Homemaker	1	0.5

### 3.2. Measures

The six items used to assess aesthetic design were taken from Wu et al. (2008), Hamari et al. (2010) e.g. "I feel Metaverse Game's sound effects are good". Respondents were asked to provide their opinions on these four items. The Hedonic Motivation scale, comprising four items, was adopted from Chang et al. (2011). Players of Metaverse games were asked to rate on a Likert scale, including "Metaverse games are a way I like to spend my leisure time". The six items used to evaluate utilitarian motivation were taken from Chang et al. (2011). Metaverse game players were asked to give their opinion by using a five-point Likert scale for items including "Metaverse games improves my performance". Six items adopted from Kim et al. (2006) were employed in a survey conducted online, in which participants were asked to provide their thoughts on a Likert scale e.g. of items such as, "Metaverse Games enable me to maintain friendships". In-game Purchases from were measured using four items (Hamari & Keronen, 2017). This was also scaled, asking from metaverse gamers to give their opinion through five-point Likert scale of such items like "I purchase free to play items that I enjoy". A Likert scale was used for all of the measurements (strongly disagree and strongly agree).

### 3.3. Method of Data Analysis

PLS-SEM, or partial least squares structural equation modeling was used to examine the data. There were no missing values or outliers. Models are evaluated using PLS-SEM in two stages. When the structural model was evaluated in step two, the hypothesis was put to the test. When the structural model was evaluated in step two, the hypothesis was put to the test.

## 4. Results

### 4.1. Measurement Model

At first measurement model was assessed. After the measurement model is judged suitable, the structural model is assessed. The first step to undertake in testing the measurement model was to conduct some research on item loading. Since the loadings show that the concept explains more than 50% of the variance in indicators, loadings higher than 0.708 are recommended, offering a

satisfactory range of item dependability. Internal consistency was used in this study to gauge dependability. The internal consistency of the motives was investigated using composite reliability (CR). CR threshold value was 0.7 (Gefen et al., 2020). CR was then used to evaluate internal consistency reliability. Higher rescores are seen as more dependable, whereas 0.60 to 0.70 are regarded as adequate to good. Values of 0.95 or higher, on the other hand, are regarded as troublesome and show low concept validity and item redundancy (Diamantopoulos et al., 2012). Cronbach alpha ( $\alpha$ ) was used to verify the structures' internal consistency dependability. All of the  $\alpha$  surpassed the necessary least of 0.70 (Hair et al., 2021), thus proving that each of the measurement items of each construct is highly reliable. In particular, the internal consistency of Aesthetic Design ( $\alpha = 0.952$ ), Hedonic Motivation ( $\alpha = 0.923$ ), In-Game Purchase ( $\alpha = 0.822$ ), Social Motivation ( $\alpha = 0.948$ ) and Utilitarian Motivation ( $\alpha = 0.939$ ) was also high. These findings prove the high correlation of the indicators in each of the constructs and their consistency in measuring the latent variables.

The measurement model's excellent internal consistency and the constructs' stability and robustness for future analysis in structural models are demonstrated by reliability statistics taken together. Every loading was higher above the cutoff point (0.70) (Gefen et al., 2020). By evaluating the average variance extracted (AVE), convergent validity was also ascertained (Hair et al., 2019). The minimum value of 0.50 was less than the value of AVE. There were some items which were marginally lower in outer loadings (below 0.7), but the values were near 0.7 and it was preferred to retain that item because it had higher values of AVE than 0.5 (Hair et al., 2019). Therefore, these items have been taken into consideration and presented in Table 2. Additionally, the average variance extracted (AVE) is a measure of the convergent validity of constructs, which is the degree to which all theories converge to explain the item variation. Using SmartPLS 4.0, the Variance Inflation Factor (VIF) results were examined for multicollinearity and common method bias across all measurement items Hair et al. (2019), state that a VIF value of less

than 5.0 implies the absence of multicollinearity. AVE cannot be less than 0.50 or more and it implies that the construct explains 50 percent and more of its items. The measurement model is the first model used to examine the PLS-SEM data. The discriminant validity of the constructs was evaluated using the heterotrait monotrait ratio (HTMT) criteria (Henseler et al., 2015). All of the structures had HTMT values below 0.90, which is

regarded as satisfactory. Table 3 displays the measurement model's fair discriminant reliability based on the results. Afterward the evaluation of the measurement model, the structural model was examined. As stated by (Henseler et al., 2015), the HTMT threshold is 0.90. If the result is more than 0.90, it indicates the absence of discriminant validity.

**Table 2. Reliability Measures of the Study**

Measures	OL	CR	A	AVE	VIF
Aesthetic Design		0.960	0.952	0.799	
AD1	0.872				3.209
AD2	0.903				3.943
AD3	0.884				3.550
AD4	0.916				4.859
AD5	0.898				4.130
AD6	0.889				3.808
Hedonic Motivation		0.944	0.923	0.809	
HM1	0.906				3.545
HM2	0.896				3.160
HM3	0.893				3.014
HM4	0.904				2.993
In game Purchase		0.924	0.822	0.752	
IGP1	0.870				1.227
IGP2	0.875				2.397
IGP3	0.878				2.250
IGP4	0.845				2.480
Social Motivation		0.961	0.948	0.832	
SM1	0.863				2.650
SM2	0.922				4.365
SM3	0.915				4.172
SM4	0.929				4.918
SM5	0.930				4.543
Utilitarian Motivation		0.949	0.939	0.758	
UM1	0.863				3.446
UM2	0.879				4.274
UM3	0.861				3.645
UM4	0.872				3.712
UM5	0.877				3.421

UM6	0.872	3.689
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Note: AD =Aesthetic design; HM = Hedonic Motivation; IGP = In game Purchase; SM = Social Motivation; UM= Utilitarian Motivation

Table 3. Heterotrait-Monotrait Ratio (HTMT).

Constructs	AD	HM	IGP	SM	UM
AD					
HM	0.867				
IGP	0.726	0.790			
SM	0.747	0.879	0.836		
UM	0.809	0.898	0.840	0.888	

Note: AD =Aesthetic design; HM = Hedonic Motivation; IGP = In game Purchase; SM = Social Motivation; UM= Utilitarian Motivation

4.2. Structural Model

The structural model was tested using t-values, out-of-sample prediction, and the coefficient of determination (R<sup>2</sup>). The t-values were evaluated by the use of a bootstrapping method (Hair et al., 2019). The structural model, which was used to examine the PLS-SEM data, came after the measurement model evaluation. The conventional assessment criteria consist of the coefficient of determination (R<sup>2</sup>) and the cross-validated redundancy measure (Q<sup>2</sup>), which is blindfolded. Additionally, researchers use the PLS-predict procedure to analyze prediction capabilities (Shmueli et al., 2016). The variation in the endogenous components and, thus, the model's ability to explain (Shmueli et al., 2011). More explanatory power is shown by higher R<sup>2</sup> values, which range from 0 to 1. Additionally, 0.25, 0.50, and 0.75 represent mild, moderate, and substantial values, respectively (Henseler et al., 2015). Additionally, the Q<sup>2</sup> value may be used to evaluate the PLS path model's prediction accuracy. (Geisser, 1974). Q<sup>2</sup> must be >0 in order to show the correctness of structural model prediction. In order to prove predictive relevance, Q<sup>2</sup> Values ought to be higher than 0. Small predictive relevance is denoted by values more than 0, medium predictive relevance by values greater than 0.25, and big predictive relevance by values greater than 0.5. In table 4, the maximum is greater than 0.5, indicating greater predictive

relevance. Table IV shows that the H1: Aesthetic design has a positive impact on in-game purchases (0.613, p = 0.001). Additionally, Hedonic Motivation (H2a) was positively impacted by appealing design (β = 0.817, p < 0.001). Hedonic motivation's mediation impact on game purchase and aesthetic design was not supported (H2b), as Table IV demonstrates (β = 0.020, p = 0.830). The study found no favorable effect of hedonic motivation on in-game purchases (H2c) (β = 0.025, p = 0.830). The study showed that utilitarian motivation (H3a) is positively impacted by beautiful design (β = 0.785, p < 0.001). The utilitarian incentive's mediation role in game purchasing and aesthetic design (H3b) was validated (β = 0.248, p < 0.001). Additionally, it was discovered that utilitarian motivation positively impacted in-game purchases (H3c) (β = 0.316, p < 0.001). The study found that social motivation had a positive impact on in-game purchases (H4a) (β = 0.736, p < 0.001). mediates the relationship between in-game purchases and aesthetic design (H4b) (β = 0.344, p < 0.001), and influences in-game purchases favorably (H4c) (β = 0.468, p < 0.001). Cohen's (1988) f<sup>2</sup> values were evaluated to measure the relative relevance of each external construct on the endogenous variables. The f<sup>2</sup> value calculates each predictor's unique contribution to the dependent construct's R<sup>2</sup> value. The f<sup>2</sup> values of 0.02, 0.15, and 0.35, according to the recommended standards, indicate a minor,

medium, and significant influence, respectively (Hair et al., 2021).

Table 4. Structural Model Outcomes

Hyp	Relationships	B	SE	t-value	p-value	R <sup>2</sup>	Q <sup>2</sup>	f <sup>2</sup>	Decision
H1	AD -> IGP	0.613***	0.044	13.781	0.000	0.604	0.317		Supported
H2a	AD -> HM	0.817***	0.031	26.367	0.000	0.667	0.664	2.007	Supported
H2b	AD -> HM -> IGP	0.020	0.096	0.215	0.830				Rejected
H2c	HM -> IGP	0.025	0.116	0.215	0.830			0.000	Rejected
H3a	AD -> UM	0.785***	0.033	24.147	0.000	0.617	0.612	1.608	Supported
H3b	AD -> UM -> IGP	0.248***	0.084	2.958	0.003				Supported
H3c	UM -> IGP	0.316***	0.105	3.019	0.003			0.051	Supported
H4a	AD -> SM	0.736***	0.040	18.324	0.000	0.541	0.537	1.179	Supported
H4b	AD -> SM -> IGP	0.344***	0.081	4.247	0.000				Supported
H4c	SM -> IGP	0.468***	0.107	4.371	0.000			0.133	Supported

Note: AD =Aesthetic design; HM = Hedonic Motivation; IGP = In game Purchase; SM = Social Motivation; UM= Utilitarian Motivation, p<.05. \*\*p<.01. \*\*\*p<001

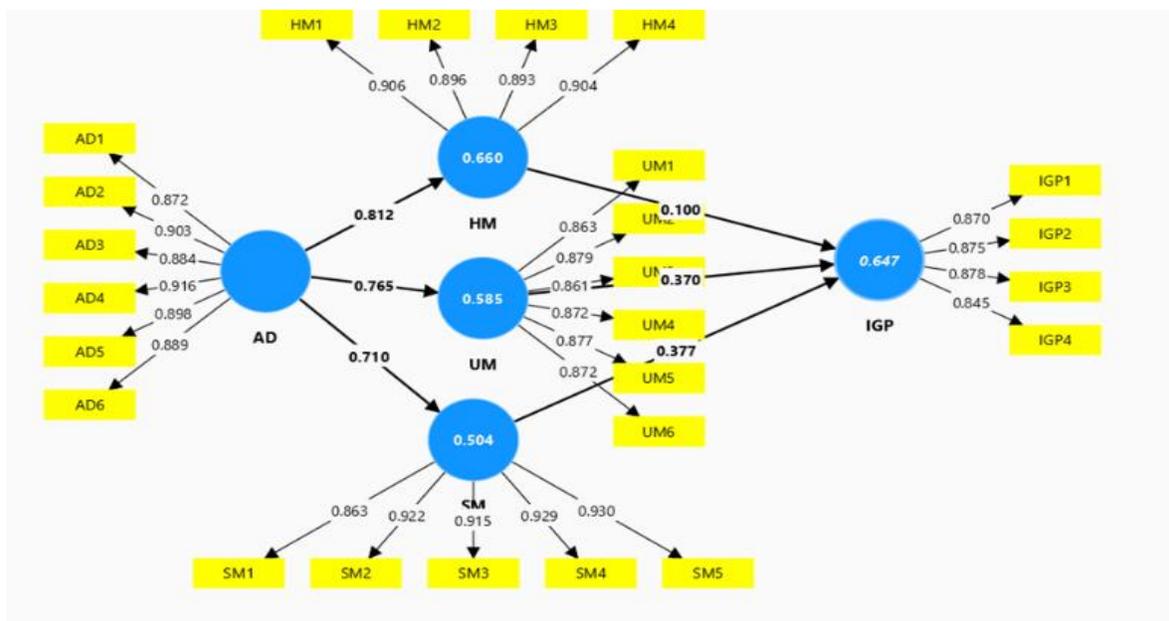


Figure 2. Structural Model

The Standardized Root Mean Square Residual (SRMR) and Normed Fit Index (NFI) were examined in order to evaluate the model's fit to PLS-SEM. 0.043 was the value of saturated model, and 0.109 was the value of the estimated model, according to the results Hair et al. (2020) A minimum of 0.08 is considered a great model fit, while 0.10 is considered adequate for complicated models. As seen in Table 5, the estimated

model's SRMR 0.109 falls within an acceptable range for PLS-SEM application. Additionally, the estimated model and the saturated model both had NFI values of 0.849 and 0.878, respectively, above the suggested minimum of 0.80, indicating an acceptable match (Henseler et al., 2016). Satisfactory values were also shown by the other indices, dULS and dG, which further supported the model fit's adequacy.

Consequently, each of these indices confirms that the structural model fits data well overall, making it

suitable for testing and interpreting hypotheses.

**Table 5: Model Fitness**

Fit summary	Saturated model	Estimated model
SRMR	0.043	0.109
d_ ULS	0.609	3.879
d_ G	0.555	0.790
NFI	0.878	0.849

## 5. Discussion

This study examined the behavioral results of users of Metaverse games, focusing on a gamification topic that has received little attention. Prior research has examined in-game purchasing intentions such as Jain and Ajay (2024), Zhao et al. (2024c) and also by Dulko and Diana (2024). This study fills this gap by adding motives for purchases to the body of prior research on in-game purchasing behavior. Using structural model analysis, Table IV illustrates how in-game purchases are predicted by aesthetic design and other motivating factors. Hypothesis 1 (H1) is well supported by research showing a significant positive relationship between in-game purchases and visual design. This immediately fills the gap in the literature that demands a more thorough comprehension of how design affects player behavior in gaming environments (Zhao, Yuxiang, Wu, et al., 2024). Furthermore, this matches other studies in the context of Pakistan, Ngah et al. (2024b), Abbasi et al. (2022) that emphasize Metaverse game aesthetic design. Consequently, aesthetically driven users in Pakistan tend to spend more in Metaverse games. Notably, Hypothesis 2b (H2b), which postulated a hedonic motivation-mediated relationship between aesthetic design and in-game purchases, was disproved. This directly addresses the observed gap in the literature (Ghazali et al., 2023, Hussain et al., 2023b, Wang et al., 2023). Furthermore, this supports extrinsic motivation theories in digital games by stating that players who likes aesthetics of games enjoy to purchase in game items (Wu et al., 2022). However, it's interesting to note that Hypothesis 2b (H2b), which postulated a hedonic motivation-mediated relationship between aesthetic

design and in-game purchases, was disproved. This insignificance could be due to cultural forces within which Pakistani gamers are more concerned with the communal identity and utility than personal enjoyment, which can be associated with collectivism orientation which relates to relatedness and competence instead of autonomy. Therefore, the weak hedonic route indicates the flexibility of SDT in different cultural settings. A plausible rationale might be that not all consumers would consistently experience an adequate level of emotional arousal or pleasure from aesthetic design, which would limit its impact on purchase behavior (Hussain, Ali, et al., 2023). One theory is that consumers' love for the game may not be enough to make them buy without extra incentives or perceived value (Jia, Furong, Yu, & Jie, 2024). Additionally, hypothesis 2c(H2c) was rejected depicting relationship in hedonic motivation and in-game purchases, may be for a number of reasons. *First*, given the vast range of individual preferences for design, it is plausible that aesthetic design alone may not elicit enough emotional pleasure to motivate purchases for all players (Hamari and Keronen, 2017). *Second*, while making judgments about what to buy, gamers may give preference to other reasons including social or utilitarian considerations over hedonistic experiences (Ponsignon et al., 2024). *Third*, cultural variations may also be important in gamification (Pan et al., 2024). *Finally*, the actual game environment might not always provide experiences that are consistently immersive or compelling enough to elicit hedonic purchasing (Yeh et al., 2024), in line with the findings of (Ma and & He, 2024). Furthermore, evidence supports Hypotheses 3a(H3a) and 4a (H4a), indicating that aesthetic design benefits utilitarian and social Motivation. These findings, indicating that aesthetic design enhances both utilitarian and social

motivations, directly address the gap in the literature by demonstrating how aesthetic elements reward users not only functionally (Lee and Younson, 2024) but also socially (Jung et al., 2024). These findings support past studies on the diverse reasons people play video games (Arpaci et al., 2022, Salman et al., 2022). However, hypothesis 3b, which show that utilitarian motive moderated the association between in-game purchases and aesthetic design, were supported and were consistent with the findings of Bayır et al. (2024), ensuring that players find useful value in things inspired by the game's beautiful design ensures that utilitarian motivation drives in-game purchases. The eye-catching design of in-game objects amplifies their functional advantages, enhancing their visual appeal while simultaneously improving playability or efficiency (Fu et al., 2024). This solidifies the choice to purchase items in Metaverse games. This directly addresses the call by Ponsignon et al., (2024) a greater grasp of how aesthetic design influences utilitarian-driven purchases in virtual environments. Similarly, Hypothesis 3c(H3c) showed direct impact of utilitarian motivation on in game purchases was supported as with the results shown by Halat and Melike (2024) this was the gap filled as called by Ghazali et al. (2023). Demonstrating functional benefits motivates game players in Pakistan to purchase in-game items, as they value utility and efficiency in enhancing their gameplay experience (Abdullah et al., 2024). Furthermore, hypothesis 4b was Supported, indicating that mediation effect of Social motivation was present between Aesthetic design and in game purchase, This finding aligns with scholars who have previously emphasized the role of social motivation as a mediator (Abrar et al., 2024). These results filled the gap called by Jung et al. (2024). Similarly, Hypothesis 4c (H4c) showed direct impact of Social motivation on in game purchases was supported, line up with the results of Hassan Butt et al. (2024). In order to improve their social standing and relationships within the gaming community, Pakistani gamers are encouraged to buy in-game stuff by emphasizing the social benefits.

## 6. Conclusion

### 6.1. Theoretical Implication

In-game purchases, aesthetic design, and motivation theory all have an impact on game and

digital environment researchers. These characteristics can show gamers' preferences and purchases. The key theoretical implications of this study are as follows. First, the study found that the aesthetic design of Metaverse games promotes in-game purchases and psychological connections with the game. Second, it highlights the role of motivation boosters in driving in-game purchases. Third, this model demonstrates how related components influence game judgments, thereby expanding the scope of digital consumer theories. Third, this model demonstrates how related components influence game judgments, thereby expanding digital consumer theories. This study contributes to digital user behavior research by enhancing the understanding of game aesthetics, in-game purchases, and incentive theories. In-game purchase advertising, research, and development may all profit.

### 6.2. SDG Implications

According to the study, the beautiful designs of Metaverse games encourage in-game purchases and emotional bonds. This demonstrates how economic activity within digital platforms may be directly stimulated by design factors. From an SDG standpoint, this realization helps clarify how the digital economy can support "Decent Work and Economic Growth" (SDG 8) by opening up new opportunities for the production of digital content, games, and associated services, which could result in the creation of jobs and economic value in the creative industries. Additionally, by breaking down the mechanisms of user spending and engagement in virtual environments, this study offers fundamental knowledge that can guide the creation of accountable, transparent, and equitable digital systems that support the values of justice, peace, and strong institutions (SDG 16). This study contributes to the theories of gamification and digital consumer behavior while providing useful insights for creating more just digital ecosystems and sustainable economic growth.

### 6.3. Practical Implications

Understanding in-game purchase incentives allows game developers and e-commerce specialists to improve their business strategies. Game developers

may be able to enhance the game experience by utilizing aesthetic design. A distinctive, aesthetic, and appealing design stimulates in-game purchases. This may enhance the effectiveness of in-game advertising. Game aesthetics improve user involvement and pleasure. In-game spending increases with engagement, which may increase income. This study advances theoretical knowledge and provides practical advice to gaming corporations. Motivation theory, along with detailed frameworks, provides a comprehensive view of strategic decisions and firm performance.

#### 6.4. Future Recommendations

The future research should be focused on considering every aspect of player behavior as well as the lack of external effects by gaming corporations. It also needs to bring into consideration marketing and promotional features to have a greater insight into their effects on in-game buyer dynamics. The present research has mainly looked at short-term impacts; hence, future research on the topic should focus on long-term benefits and retention of players. Further, highlighting on the sustainability of the in-game economy due to the length of existence would offer some insight on behavioral sustainability. Moreover, analyzing the contextual or moderating variables that may moderate such relationships would also be useful in order to narrow down the motivation theory in the digital gaming environment. It is specifically recommended that longitudinal research should be used to demonstrate how the motivational factors change with time and that impact on the engagement or purchase behavior of the players. Future studies can use longitudinal research to determine changing motivation, cross-cultural test of SDT in the digital environment, and the concept of AI-based personalization as a mediator of aesthetic experience.

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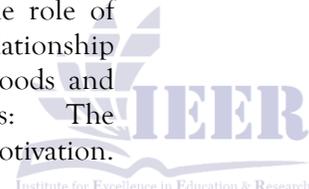
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