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AN ANALYSIS OF THE ACCEPTANCE OF LOOT BOXES USING THE MODIFIED TECHNOLOGY ACCEPTANCE MODEL: THE EMPIRICAL EVIDENCE FROM VIDEO GAME PLAYERS IN SERBIA

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Business models in the video game industry have shifted from physical to digital. With microtransactions, game producers have been provided with the ability to charge for extra in-game content. Loot boxes are one of the most controversial forms of microtransactions in video games. These are the prize packages that consist of one or multiple virtual items, whose specific content remains unknown to the player prior to opening. This study is aimed at identifying the combination of the factors that act as motivators for players in Serbia to engage themselves in monetary transactions for the purchase of loot boxes. To address the requirements of the study, modifications were made to the fundamental Technology Acceptance Model (TAM) so as to encompass the additional variables that had been perceived as significant for players' decision-making processes. The findings of the study indicate the fact that the "perceived enjoyment, customization", and "perceived ease of use" variables are the important factors that can predict the "perceived usefulness of loot boxes" variable. Additionally, the "perceived usefulness of loot boxes" and "propensity for gambling" variables are significant predictors of players' intention to purchase. Furthermore, the "intention to purchase loot boxes" variable has a statistically significant impact on the "actual use of loot boxes" variable.

Keywords: loot boxes, microtransactions, TAM, gambling propensity, customization

JEL Classification: D91, L82, L83, L86, O33

INTRODUCTION

The emergence of contemporary information and internet technologies has led to a variety of

revolutionary innovations within the video game sector. The widespread adoption of smart devices has resulted in a global user base exceeding two billion individuals (Pitić, Kržić, Vuković & Ilić, 2020), leading to a significant expansion within the entertainment industry. The rapid growth of the sector is illustrated by the substantial profits generated by the largest companies operating within the sector, which are

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measured in billions of US dollars. Based on pertinent statistical data, it is observed that the estimated market value shows an approximate increase of 15% for 2021 in comparison with the preceding year, accompanied by optimistic projections for future growth. The positive values of all the indicators were affected by the pandemic lockdown, working from home and changes in entertainment habits in the absence of sports and cinema content (Bošković, 2021). In line with the advancement of the industry and shifts in user's habits and preferences, new approaches for video game monetization are being established.

The business models employed within the video game industry have gone through a transformation, transitioning from physical distribution to digital platforms. During the pre-digitalization era, companies employed a retail model that involved distributing games in tangible formats such as cartridges and compact discs. This model exhibited issues in terms of efficiency, speed, and costs, as the final iteration of the game had to be designed to full functionality and required rigorous testing prior to its release for commercial purposes (Dillon & Cohen, 2013). Along with the widespread adoption of the Internet, technological advancement has enabled the emergence of a new business model both in terms of hardware and software innovations. Players no longer need to acquire physical copies of the video games, since digital distribution allows them to pay a single fee to download a digital file from an online platform and subsequently install the purchased game on their personal device. The application operates on the "pay-to-play" model, in which the player is required to pay a premium price in order to access the complete content of the game (Davidovici-Nora, 2014; Klimas, 2017; Tomić, 2017). Still, this particular model shows certain imperfections. It makes publishers receive a fixed amount of compensation irrespective of the subsequent popularity of the game and duration of its use. Essentially, publishers did not have the ability to generate revenue from the games that remained popular among gamers for a longer period following their initial release. Hence, the concept of microtransactions emerged, enabling publishers to monetize supplementary in-game content.

Loot boxes represent the most controversial manifestation of microtransactions in the video games world. The critique directed towards these microtransactions arises from their resemblance to games of chance and gambling (Garret, Drummond, Lowe-Calverley & Sauer, 2023; Brooks & Clark, 2023). Loot boxes can be defined as collections of rewards encompassing one or multiple virtual items (Xiao, 2021), whose content is unknown to the player prior to their opening, thereby introducing an element of uncertainty. Loot boxes have received significant attention in both psychological research and legal analysis due to their unique nature compared to other microtransactions. In contrast to alternative microtransaction models, loot boxes involve a level of uncertainty, where players are unaware of the specific content they will obtain. The unique attribute mentioned has sparked an extensive examination of the psychological effects of loot boxes, as well as the imperative for regulatory interventions. Hence, the empirical section of this study will employ the Technology Acceptance Model (TAM) in order to examine the diverse factors that impact the use of loot boxes.

The factors influencing the adoption of loot boxes as prevalent microtransactions in the contemporary video game industry are the subject matter of this research. The goal set by the conducted study is to identify the combination of the factors that serve as motivators for players in the Republic of Serbia (RS) to engage themselves in monetary transactions for the acquisition of loot boxes. The basic TAM will be modified for the purpose of this study so as to include the additional aspects that are recognized herein as potentially significant for players' decision-making.

The paper is organized into three logically interrelated sections. The first section elucidates the notion of microtransactions and provides a definition of loot boxes as a distinct element within this conceptual framework. The second section represents the theoretical background of this research study, explaining the research methodology by introducing the fundamental TAM and clarifying the critical requirement for a modification. The final section of the paper discusses the findings obtained from the conducted research study.

LOOT BOXES AS A CONTROVERSIAL FORM OF MICROTRANSACTIONS

According to E. Markopoulos, P. Markopoulos, M. Liumila, Y. Almufti and V. Aggarwal (2020), the predominant revenue generation strategy employed by publishers is game monetization through microtransactions. While commonly perceived as a substitute for a premium game sale, this model is in fact integrated within the games that require an initial payment from the user (Bank, 2023). Subscription is one of the frequently applied microtransaction models. That model implies that players make periodic payments in order to gain access to the game for a specific duration (Klimas, 2017). In this manner, publishers are able to generate additional revenue by capitalizing on the sustained popularity of the video game. The second model allows the purchase of the supplementary content associated with the primary gameplay, commonly referred to as downloadable content (DLC). This additional content encompasses various elements, including but not limited to new missions in action games, new factions or campaigns in strategy games, additional vehicles or tracks in racing games, the inclusion of classical teams in sports games, the introduction of new characters in fighting games, and similar enhancements. The third model illustrates a comprehensive transition from the conventional premium model to the freemium or free-to-play (F2P) model, wherein free access to the game is provided until a specific level is reached, at which point payment becomes obligatory.

According to N. Tomić (2017), payment may be contingent upon a sudden deceleration of progress within the game or an entire suspension of gameplay, accompanied by an explicit call to make a payment in order to continue playing. The primary objective of the F2P model is to prioritize the player's experience over its monetization, as highlighted by M. Davidovici-Nora (2014). Initially, users are granted free access to the basic content of the video game, which mobilizes a large number of players. It is postulated that an extended duration of playing generates an increased tendency among players to acquire supplementary content, driven by the motivation to protect against losing any of their progress. The fourth model is the

most acceptable in the eyes of the gaming community. It refers to the so-called cosmetic microtransactions, which do not alter the game's balance or the gaming experience. The aforementioned features include visual or audio improvements for a character controlled by a player, which are designed to enhance the player's experience within a video game. Cosmetic microtransactions, for instance, include the alternative appearances of the characters, the availability of alternative costumes (commonly referred to as skins), or the inclusion of corresponding audio components.

Loot boxes represent a prevalent form of microtransactions, known across various genres of video games, even including those sold at a premium price. According to L. Y. Xiao (2021), these prize packages comprise one or multiple virtual items and operate in a manner analogous to the lottery. The boxes hold a sense of enigma, as their contents remain secret until they are opened (Tomić, 2018; Cerulli-Harms, Münsch, Thorun, Michaelsen & Hausemer, 2020). The selection of the virtual item that the player receives occurs in a random manner following the payment authorization (Senate Standing Committees on Environment and Communications, 2018). Therefore, they may contain the objects that only alter the game's appearance, or they may contain items that have a direct impact on the gameplay itself, such as new weapons, armor, skills, or more powerful capabilities.

The level of uncertainty associated with loot boxes is contingent upon the specific design that is employed. Therefore, along with the corresponding probabilities of obtaining specific items, the level of uncertainty is comparatively reduced in the gaming scenarios where players are provided with a catalog of potential rewards from purchased boxes in contrast to the situations where the content of the boxes is entirely unknown to the player. The player does not actually pay for a particular virtual object; rather, they pay for the opportunity to potentially obtain an item from the offered selection. Due to the significantly low likelihood of acquiring the desired item, players will have to engage in the repeated purchase of loot boxes so as to attain the intended content (King & Delfabbro, 2019). This practice effectively fosters a

pattern of regular purchases. Hence, there is concern regarding the potential of this particular video game monetization mechanism to serve as a transitional link between gaming and gambling (Drummond & Sauer, 2018).

The debate on whether the act of purchasing loot boxes can be regarded as a type of gambling involves a broad range of ethical considerations and regulatory implications. The experts specializing in gambling regulation in Belgium and the Netherlands have identified certain loot boxes that are in violation of their respective gambling legislation (King & Delfabbro, 2018; Woodhouse, 2021). The Danish authorities conducted an analysis of several video games featuring loot boxes and determined that the gambling legislation could not be enforced in the cases where virtual items could not be monetized or converted into a real currency (Senate Standing Committees on Environment and Communications, 2018). If purchased virtual items are subsequently traded on external platforms and converted into an actual currency, these loot boxes may be subject to regulations pertaining to gambling. The legal definition of loot boxes as a form of gambling remains unclear in certain jurisdictions due to the absence of the financial loss associated with their purchase and the perception that the virtual items obtained lack real value (Schwiddessen & Karius, 2018; King & Delfabbro, 2019). Due to the great diversity of interpretation in different European legislations, the European Parliament passed a resolution at the beginning of 2023, calling on the European Commission to deal with this issue in detail and issue guidelines, recommendations or a binding act with the aim of harmonizing legislation at the EU level.

THE THEORETICAL FOUNDATION OF THE RESEARCH

Literature review

Previous analyses of the factors impacting video game consumption have primarily relied on the TAM. The

selection made is not arbitrary, since the “perceived ease of use” and “perceived usefulness” variables accurately demonstrate the nature of video game consumption. Engaging oneself in an activity that provides both amusement and relaxation necessitates simplicity in addition to its usefulness for the player. The majority of researchers have decided to adapt the basic model and augment it by incorporating the factors that are unique to the consumption of video games, which on its part enables greater accuracy in assessing the factors that drive the player’s motivation.

In their comprehensive analysis, X. Wang and D. H. L. Goh (2017) made a review of the 50 scientific articles that employed the TAM. Their findings revealed that, alongside the fundamental variables of the model, the “perceived enjoyment” variable emerged as statistically significant in the majority of the examined studies. According to C. C. Chang and P. Y. Chen’s (2018) analysis of social media games, the two most crucial gaming factors perceived are enjoyment and socialization. D. H. Bassiouni, C. Hackley and H. Meshreki (2019) conducted a simultaneous analysis of the various factors that had an influence on both children and parents within the families that engaged themselves in playing video games. The researchers reached the conclusion that social factors were crucial for children, whereas parents prioritized the “perceived enjoyment” variable and the ability to engage themselves in the activities with their children that aligned with their preferences. In their study, Y. Lu, S. Papagiannidis and E. Alamanos (2019) introduced the e-TAM, which was specifically designed to address the emotionally conditioned use of technology, such as in the context of video games. The primary variables in this iteration of the TAM include personal well-being, perceived value, the emotions associated with achievement, and the emotions associated with a loss.

Numerous studies have been conducted in order to assess the phenomenon of loot boxes, with a particular focus on highlighting the harmful effects associated with their consumption. In a study carried out by A. Drummond and J. D. Sauer (2018), it was demonstrated that, within a sample of the 22 video games that had been regarded by the Entertainment Software Rating

Board (ESRB) as suitable for child users, a total of 10 of these games all had the features inherent to gambling. Some researchers argue that the act of purchasing loot boxes should not be classified as gambling due to the assurance that players will receive some content, even if it does not align with their initial preferences (Griffiths, 2018). The study conducted by C. Primi, F. Sanson, M. Vecchiato, E. Serra and M. A. Donati (2022) revealed an association between the purchase of loot boxes and gambling tendencies among adolescents. This relationship was found to be mediated by several factors, including the frequency of video game consumption, problematic video game playing, and regular engagement in gambling activities. According to D. L. King, P. H. Delfabbro and M. D. Griffiths (2011), the reward-related aspects present in video games have the potential to create a significant influence on players' problematic behaviors. In a similar vein, there are concerns that some in-game purchasing systems, such as loot boxes, may lead to the development of gaming disorders.

Based on the available literature, no empirical investigations appear to have been conducted on the phenomenon of loot boxes specifically targeting a sample of players from RS. Furthermore, a comprehensive database of the academic literature concerning the subject matter of microtransactions authored by researchers from RS or those from neighboring countries is currently lacking. References in the domestic literature are primarily limited to the online forums dedicated to video games and specialized magazines that particularly address the issue. This research study will therefore not only be a pioneering effort for future research in RS, but it will also be useful for making comparisons with the work done by researchers from other European countries.

The Technology Acceptance Model (TAM)

TAM is widely recognized as the predominant model used to explain and predict the level of the acceptance shown by users towards novel technologies (Filipović, 2020). The original version of the model was formulated by F. D. Davis (1989), with the primary objective of describing the process by which users

adopt and embrace new technologies, particularly in the context of online environments (Agag, Khashan & ElGayaar, 2019). In the initial framework, F. D. Davis (1989) places an emphasis on the two predictor variables, namely the "perceived ease of use" and "perceived usefulness" variables. The first is defined as "the degree to which a person believes that using a particular system would be free of effort", while the "perceived usefulness" variable is regarded as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). The variables in TAM are influential in shaping an intention to use a specific technology. The user's self-perception of using a certain technology in the future serves to quantify the behavioral intention to use, which is anticipated to result in the actual use of that particular technology (Kondo & Ishida, 2014).

When speaking about analyzing the acceptance of online video games, TAM was the model of choice in most research studies, as noted by S. Chauhan, M. Mittal, M. Wozniak, S. Gupta and R. Perez de Prado (2021). The reason for such broad acceptance of TAM lies in the model's simplicity and ease of application (Kondo & Ishida, 2014). It is based on the theory of reasoned action, which claims that a person's behavior is influenced by that person's attitude towards a certain course of action (Buabeng-Andoh, 2018). TAM defines technology acceptance as a process in which external factors lead to cognitive reactions in the form of the "perceived usefulness" and "perceived ease of use" variables, thus forming an affective response through the attitude towards using technology and indirectly influencing user behavior (Kondo & Ishida, 2014; Marikyan & Papagiannidis, 2023).

In the initial revision of the TAM, attitude was introduced as a mediating variable between the perceived usefulness and perceived ease of use variables, on the one hand, and the intention to use variable, on the other (Davis, Bagozzi & Warshaw, 1989). However, in the following iterations, the attitude was omitted from the model due to the recognition that it had a limited mediating effect within the model. It was found that the perceived usefulness and perceived ease of use variables directly influenced the

intention to use variable (Aziz, Harun, Baharom & Kamaruddin, 2020). Although it has a direct influence on the intention and behavior, the perceived ease of use variable mostly affects usefulness and has an indirect effect on user behavior (Hsu & Lu, 2004). In other words, if a potential user considers a new technology to be simple to use, he or she is more likely to find it useful, which influences the adoption of that particular technology as the end result of the process. Figure 1 shows the structure of the general TAM.

The modification of the basic model

For the purpose of achieving the goals set herein, the fundamental TAM is modified by the introduction of new factors. These new variables have the purpose to explain in greater depth the reasons why players choose to purchase loot boxes.

Perceived ease of use

This is TAM's source variable with a dual impact. The construct of the "perceived ease of use" variable is identified as a significant predictor of the "perceived usefulness" variable. However, when considered alongside the "perceived usefulness" variable, it also exerts an influence on individuals' intentions to use a technological product or service. The explanation arises from the TAM, whose origins can be traced back to the period of the revolutionary usage of personal computers and the Internet. Almost every technological innovation raised the open question of how much work the user needs to put in in order to obtain the intended benefits from its use. Accordingly, the following hypothesis is tested:

H1: The perceived ease of use variable significantly impacts the perceived usefulness variable.

Perceived enjoyment

The act of opening a loot box generates a sense of personal satisfaction for the player. According to L. Y. Xiao (2021), the experience is enhanced by the inclusion of impactful visual elements and celebratory audio effects, thereby intensifying the

sense of triumph. The presence of such effects is believed to enhance players' tendencies to engage themselves in repeated purchases and eliminating them may facilitate players' concentration on the actual content of loot boxes (King & Delfabbro, 2019). Hence, the construct of the perceived enjoyment variable is inherently subjective by nature. The perceived enjoyment variable was extensively applied in numerous scientific studies in order to modify TAM (Chen, Lu & Wang, 2016; Wang & Goh, 2017; Linares, Gallego & Bueno, 2021). It was used to predict expected usefulness, so the following hypothesis was proposed:

H2: The perceived enjoyment variable significantly impacts the perceived usefulness variable.

Customization

While most items can also be won through gameplay, some of them are only exclusively available in purchased loot boxes (King & Delfabbro, 2019). Thus, players have an impetus to achieve diversity and originality in the characters they control by paying for opening loot boxes. Uniqueness is of the highest priority in online games, where the majority of players try to stand out from a myriad of similar player avatars. Customization is a common variable in numerous video game-related studies (Turkay & Kinzer, 2014; Kristanto, 2019). In the modified model used in this study, it was taken as a predictor of the perceived usefulness variable, as a greater degree of content customization provides participants with a greater subjective sense of utility.

H3: The "customization" variable significantly impacts the "perceived usefulness" variable.

Perceived usefulness

The "perceived usefulness" variable reflects the assessment made by users regarding the extent to which a particular technological solution is expected to enhance their own business performance. In the context of this study, the benefit refers to the enhancement of the gaming experience brought about by loot boxes. In the fundamental TAM, the

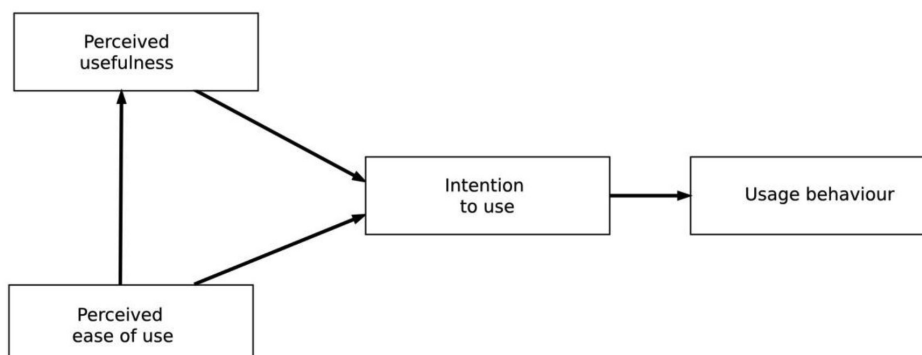


Figure 1 The general TAM

Source: Adapted from F. D. Davis, R. P. Bagozzi and P. R. Warshaw (1989, p. 985)

“perceived usefulness” and “perceived ease of use” variables have a major effect on the intention to use a technological product. In the studies conducted by H. Chen, W. Rong, X. Ma, Y. Qu and Z. Xiong (2017), M. Gawron and A. Strzelecki (2021), and Z. Zhang, Q. Li and Y. Li (2021), both variables have a statistically significant influence on the intention to use variable.

H4: The “perceived usefulness” variable significantly impacts the intention to purchase.

H5: The “perceived ease of use” variable significantly impacts the “intention to purchase” variable.

Gambling propensity

The study conducted by D. Zendle and P. Cairns (2018) discovered a positive correlation between the monetary expenditure on loot boxes by players and the extent of problem gambling. The number of research studies examining the comparability between loot boxes and gambling is steadily expanding. However, it remains uncertain whether the act of purchasing loot boxes consistently stimulates a player’s preference for engaging him- or herself in gambling activities, or the influence operates in the reverse direction. A. Drummond and J. D. Sauer (2018) conducted a study of the 22 gaming instances that incorporated loot boxes, eventually coming to the conclusion that those game features had significant structural and psychological similarities to gambling. According to

M. D. Griffiths (2018), specific menu designs employed in the consumption of loot boxes have the potential to contribute to problem gambling tendencies in those at risk. Due to the potentially significant impact of this variable, it was incorporated into the model to ascertain the potential influence of gambling propensity on players’ tendencies to purchase loot boxes.

H6: The “gambling propensity” variable significantly impacts the “intention to purchase” variable.

Loss aversion

Similar to the other types of microtransactions, loot boxes frequently follow the idea that they can be obtained as a form of reward through dedicated gameplay, patience, or viewing advertisements, without additional payments (Cerulli-Harms *et al.*, 2020). To clarify, the aforementioned boxes are designed specifically to be gained through individual gameplay, thereby attracting an extensive base of the players who do not participate in microtransactions (Stanev, 2020). Nevertheless, the process of accessing loot boxes requires significant commitment, effort, and time (Children’s Commissioner for England, 2019), which is the reason why players frequently turn to microtransactions in order to accelerate the procedure. Loss aversion is a well-known psychological phenomenon in which an individual prioritizes avoiding the loss of what has already

been gained over the acquisition itself. By using this strategy, publishers seek to motivate players to engage themselves in monetary transactions to unlock a loot box, thereby ensuring the retention of the rewards they have already gained through gameplay. In certain cases, most players are unable to think wisely to realize that not opening does not imply a loss of the obtained, because the acquisition is related to the moment of payment itself. The authors are unaware of any previous use of this variable in terms of its influence on players' propensity towards microtransactions. According to Y. Lu *et al* (2019), the consideration of a loss-related emotion is crucial when examining the phenomenon of video game addiction. The loss aversion variable has a significant impact on the intention to purchase loot boxes variable, hence the following hypothesis is proposed:

H7: The "loss aversion" variable significantly impacts the "intention to purchase" variable.

The intention to purchase

According to the original TAM, the intention to use a technological product or service is regarded as a direct determinant of its actual use. The relationship between these two variables should demonstrate the meaningfulness of the overall model. If the intention to purchase loot boxes does not result in their actual usage, then the significance of the preceding variables, which exert an indirect and sublimated

influence through the purchasing intention, becomes irrelevant. A large number of research studies have consistently proven a causal relationship between beliefs, intentions, and behaviors in the domain of technology adoption and usage (Davis *et al*, 1989; Davis, 1989; Igarria, Parasuraman & Baroudi, 1996; Limayem, Khalifa & Frini, 2000; Chen, Gillenson, & Sherrell, 2002). Thus, the following hypothesis is proposed:

H8: The "intention to purchase" variable significantly impacts the actual use of loot boxes.

Figure 2 shows the modified model with the additional variables.

EMPIRICAL RESEARCH

The research methodology

The present study employed the structural equation modeling (SEM) approach so as to simultaneously examine the impact and causal relationships among multiple variables. SEM is the fundamental methodology employed in the models that include the variables representing both dependent and independent factors. In addition to estimating the correlation coefficients between the variables, SEM provides the values of the model fit indicators.

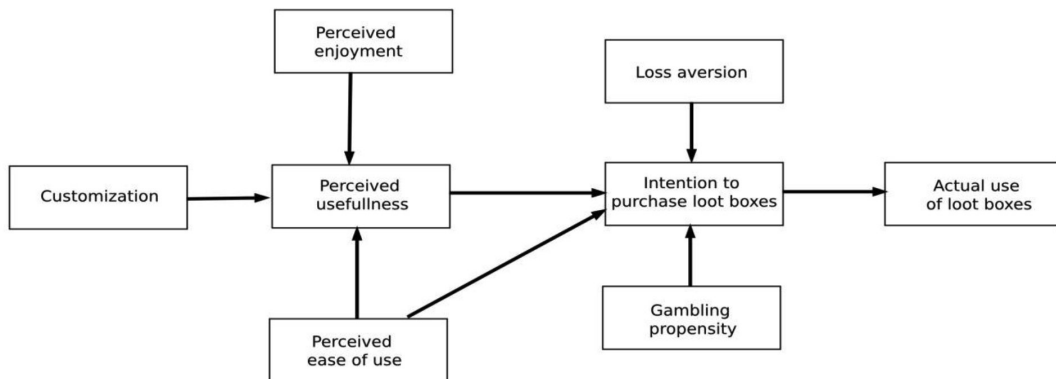


Figure 2 The modified TAM

The research data were gathered through a questionnaire uploaded on a video games forum gathering domestic players in May 2023. In addition to the section that gathers demographic data about the respondents, the questionnaire includes the 24 items that are assessed using a five-point Likert scale. The statements are so designed to incorporate an attitude towards the use of loot boxes, wherein the participant assesses their level of agreement on a scale from 1 to 5, with 1 indicating complete disagreement and 5 indicating complete agreement. According to C. J. McDaniel and R. Gates (2006), the Likert scale is the most effective instrument for obtaining respondents' attitudes. Only players who had previously purchased or planned to purchase loot boxes submitted further information, which was critical to the adoption of the statement(s). A total of 434 replies were obtained in the final phase. The structure of the responders is given in Table 1.

To assess the validity of the formulated questions, an initial pilot study was conducted using a limited sample size. Cronbach's alpha coefficient was employed so as to assess the internal consistency and reliability of the questionnaire items. The low values of this indicator mean the variables had not been formulated using the adequate questions or that it would be better to exclude one of the questions when formulating the variable under observation.

Cronbach's alpha test was conducted on a test sample in order to assess the validity of the formulated questions. The obtained values exceeded the threshold of 0.70 (Taber, 2018), indicating acceptable validity. Consequently, data collection proceeded accordingly. The arithmetic mean, the standard deviation and Cronbach's alpha were computed using the SPSS 22 statistical software based on the collated data. Following that, the analysis was transferred to the Amos 23 statistical software. Table 2 presents the descriptive statistics and Cronbach's alpha values for all the variables.

The research results

Prior to assessing the correlation between variables, it is necessary to evaluate the adequacy of the model. Fit indicators are calculated in order to assess the compatibility of the proposed model with the data collected. Table 3 displays the chosen indicators.

The basic indicator, which is the ratio of the χ^2 test statistic to the freedom degrees, does not indicate a satisfactory level of fit. Nevertheless, this issue is frequently encountered in research as the coefficient level is contingent upon the size of the sample and shows significant growth as the number of observations increases (Schermelleh-Engel, Moosbrugger & Müller, 2003; Vandenberg,

Table 1 The sample structure

Categories	Answers	Number of observations	Frequency
Gender	Male	401	92.40%
	Female	33	7.60%
Age	18-25	157	36.18%
	26-35	142	32.72%
	36-45	104	23.96%
	over 45	31	7.14%
Education	High school	50	11.52%
	Student	158	36.41%
	Bachelor's	148	34.10%
	Master's or Ph.D.	78	17.97%
Loot box use	Intends to use	240	55.30%
	Once	121	27.88%
	Multiple times	73	16.82%

2006). In this study, an expanded set of fit indicators, specifically the NFI, CFI, GFI, and SRMR, were incorporated so as to account for a large sample size. All the four indicators have optimal values, with the SRMR indicator meeting a more rigorous criterion, as is evidenced in the table.

The main results are accounted for in Table 4. The exogenous variable column displays the independent variables within the given relationship, whereas the endogenous variable column represents the dependent variables corresponding to that relationship. The p-value column is essential for determining the significance of the influence exerted by the independent variable. Its low values are indicative of a high level of statistical significance. If the p-value is denoted by the asterisks, it is less than 0.001, thus indicating the confidence level greater than 99.9%.

The analysis confirmed that the “perceived ease of use”, “perceived enjoyment” and “customization” variables had a statistically significant impact on the “perceived usefulness” variable. Moreover, the

statistical significance of the impact of the “perceived usefulness” and “gambling propensity” variables on the “intention to purchase” variable, as well as the “impact of the intention to purchase” variable on the “actual use of loot boxes” variable, was validated. All the perceived effects were statistically significant, as is indicated by the p-value being below the threshold of 0.001. According to the same logic, there is no evidence of a statistically significant relationship between the “perceived ease of use” and “loss aversion” variables on the intention to purchase. Six of the eight hypotheses set herein are confirmed according to the results. Table 5 provides a summary of the hypotheses confirmation.

The intensity of the influence can be assessed by examining the regression coefficients obtained. The “perceived enjoyment” variable is the dominant factor influencing the “perceived usefulness” variable, whereas the influence of the remaining two variables is nearly equal. When examining the “intention to purchase” variable as the dependent variable, it can be seen that the “perceived usefulness” variable

Table 2 The descriptive statistics and Cronbach’s alpha value

Variables	Arithmetic mean	Standard deviation	Cronbach’s alpha
Perceived usefulness	4.156	0.822	0.848
Perceived ease of use	3.850	0.782	0.807
Perceived enjoyment	3.813	0.840	0.756
Customization	3.744	0.859	0.754
Gambling propensity	3.587	1.016	0.762
Loss aversion	3.917	0.874	0.772
Intention to purchase	4.136	0.973	0.813
Actual use of loot box	4.210	1.009	0.891

Source: Authors

Table 3 The model fit indicators

Indicators	Values	Recommended values	Fit
χ^2/df	21.54	<5(3), E. G. Carmines and J. P. Mclver (1983)	No
NFI	0.913	>0.90, P. M. Bentler and D. G. Bonett (1980)	Yes
CFI	0.916	>0.90, P. M. Bentler (1990)	Yes
GFI	0.901	>0.90 K. G. Jöreskog and D. Sörbom (1986)	Yes
SRMR	0.072	<0.10(0.08), P. M. Bentler (1995)	Yes

Source: Authors

has a greater influence. In relation to the association between the “intention to purchase” and “actual use of loot boxes” variables, the coefficient exhibits a significantly high value (marginally below 0.87), which finding holds considerable significance for the model given the fact that the intention to purchase stands as the sole predictor.

CONCLUSION

TAM is frequently employed when examining the hedonic dimension of a technological product consumption. This study has effectively enhanced the model by incorporating the additional variables that are particularly specific to microtransactions. The study reveals a significant relationship between the “perceived enjoyment” and “perceived usefulness” variables, aligning with previous academic research on the subject matter of microtransactions. The

significance of the “customization” variable is also notable, aligning with the numerous studies that emphasize the importance of this aspect in contemporary video games. The overall finding indicates that the “perceived ease of use” variable does not reflect the significance that it potentially could have within the framework of this model. The variable in question is a fundamental component of the foundational model, thus it is incorporated into the expanded model employed in this study. Its influence does not meet the expectations as there was no statistically significant impact on the intention to purchase variable, which can partly be explained by the fact that, in this study, the relative importance of the “ease of use” variable to the other variables is lower than when the basic TAM is used to analyze the acceptance of technological products and services by the general population. In this instance, reference is made to the video game players who are familiar with the purpose and function of microtransactions or

Table 4 The correlation between the exogenous and endogenous variables

Exogenous variables	Endogenous variables	Coeff.	SE	p-value
Perceived ease of use	Perceived usefulness	0.168	0.039	***
Perceived enjoyment	Perceived usefulness	0.526	0.037	***
Customization	Perceived usefulness	0.228	0.034	***
Perceived usefulness	Intention to purchase	0.635	0.057	***
Perceived ease of use	Intention to purchase	0.092	0.054	0.09
Gambling propensity	Intention to purchase	0.271	0.039	***
Loss aversion	Intention to purchase	-0.060	0.047	0.21
Purchase intention	Actual use of loot box	0.868	0.027	***

Notes: *** = statistical significance for $p < 0.001$

Source: Authors

Table 5 The hypotheses status

Hypothesis	Correlation	Outcome
H1	Perceived ease of use - Perceived usefulness	Supported
H2	Perceived enjoyment - Perceived usefulness	Supported
H3	Customization - Perceived usefulness	Supported
H4	Perceived usefulness - Intention to purchase	Supported
H5	Perceived ease of use - Intention to purchase	Unsupported
H6	Gambling propensity - Intention to purchase	Supported
H7	Loss aversion - Intention to purchase	Unsupported
H8	Intention to purchase - Actual use of loot box	Supported

Source: Authors

have already used them. Therefore, the “ease of use” variable is not a significant factor for them.

Regardless of the good values of the model fit indicators and the numerous variables demonstrating statistical significance, there are still opportunities for further enhancements in research. Several studies examining the motivation of the individuals who engage themselves in video gaming incorporate a variable that refers to a social aspect. Nevertheless, the aforementioned variable is excluded in this research due to the inherent characteristics of loot boxes. The loot boxes opening does not foster player cohesion, nor does it enhance social interaction, but rather serves to distinguish individuals as it offers either character customization options or the game-altering enhancements that disrupt the current state of balance. Future research in this subject matter should incorporate a comparative aspect, wherein the findings obtained for RS will be compared with those from another European nation.

One of the limitations inherent in this study pertains to the specific cultural context of playing video games in RS. A large number of players gravitate towards the traditional model of premium game purchases, wherein they make a one-time payment for the game and avoid engaging themselves in microtransactions, without the intention to use them in the future. Furthermore, this was verified during the data collection phase. As a result, the findings of this study should not be generalized and should not apply to the entire Serbian gaming community. The interpretation of the results out of context is a special risk. This mostly relates to gambling propensity as one of the variables, whose individual observation may lead to incorrect assumptions regarding the propensity of all video game players.

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