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Gamification, Consumer Engagement, and Behavioral Economics: Insights from E-Commerce Platforms

Manjula K. A[1], Dr. Ahab Rizvi[2], Dr. Lowlesh Nandkishor Yadav[3], Itam Urmila Jagadeeswari[4], Mrs. M. Ramadevi M.E.[5] and Karthikeyan. P[6]

[1]Assistant professor, Computer Science, University of Calicut, Malappuram, Kerala.
Email: manjulaka@gmail.Com
[2]Guest Faculty, Economics, Aligarh Muslim University, Aligarh, Uttar Pradesh
Email: ahabrizvi1995@gmail.com
[3]Associate Professor Computer Science and Engineering, Suryodaya College of Engineering and Technology Nagpur Maharashtra
Email: lowlesh.yadav@gmail.com
[4]Assistant Professor - Senior Scale, Department of Commerce, Manipal Academy of Higher education, Manipal, Udupi, Karnataka
Email - urmila.itam@manipal.edu
[5]Assistant Professor, Department of Computer Science and Engineering, VSB College of Engineering Technical Campus, Coimbatore
ramadevivsbcse@gmail.com
[6]Assistant professor, Management Studies, Kannur University, Kerala.
Email -pkn2005@gmail.Com

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ABSTRACT
This study will examine how gamification influences consumer interest in e-commerce platforms with the mathematical concept of behavioral economics. Gamification has risen to become a mechanism of improving the interaction of the users, loyalty and purchasing behavior because it incorporates elements of games like points, badges leaderboard and challenges in the online shopping environment. The research uses a quantitative approach, the results of which are reviewed on 15,000 users of numerous e-commerce sites in six months. Some of the primary engagement indicators such as session length, category purchases, redemption of rewards, communication with the leaderboard, and referrals were analyzed. Findings showed that average user time per session in gamified features was 18.4 minutes, the users had an average purchase frequency of 4.2, and a reward redemption rate of 67%. Social comparison is notable that, the higher the session length (r = 0.52) and the higher the rate of referral, the stronger the interaction between the leaders. The hypothesis in favor of being a determinant in making a repeat purchase and participation was confirmed by regression analysis, showing that reward-based gamification plays a significant role. Such results are implemented on the basis of behavioral economics, such as, loss aversion, positive reinforcement and social proof showing that psychology stimuli may actually influence the behavior of consumers. The research would be of value to any e-commerce managers who need to define digital engagement strategies and proves the strategic importance of considering behavioural insights and gamification to achieve an improved user experience as well as business results.

Keywords: Gamification, Consumer Engagement, Behavioral Economics, E-Commerce, Reward Systems.

INTRODUCTION

The rising fast development of e-commerce actually changed the principles of consumer behaviour and retail orientation, compelling online applications to find new way to improve the user's involvement and promote sales. Among these would be gamification, suggesting the implementation of the principles of a game like scenario in the non-games setting, and this method turned out to be a helpful tool to manipulate consumer behavior [1]. As the e-commerce websites add new features such as points, badges, leaderboards, and challenges, they will be in a position to offer activities interactivity to enhance user participation, loyalty, and encourage desirable operations such as purchasing items and leaving a review or comment behind [2]. The interpretation of the effectiveness of gamification should be combined with behavioral economics that will be able to examine the traps in the way of thinking and psychological principles, which impact decision making. Loss aversion, social proof, reciprocity, and nudging are such concepts, which offer fascinating information in terms of how consumers can respond to

gamified experiences and exploit them to boost their engagement [3]. One of the examples can be the participant increasing competitive desire by an urgent reward or a table where the leaders are publicly observed, which triggers the desire to connect with it another time and even purchase something of a lower price. The research will attempt to carry out a review of the forgery involving gamification, as well as behavior economics within the E-commerce business environment, in order to find indications on how both the notion translates to consumer interaction and consumer behaviour. By so doing, analysis of the information provided by different online stores and evaluation of the correlations between consumers and gamified services can enable the research to quantify the impact of gamification on the measure of consumption in terms of frequency of session attended, purchases as well as total revenue provision. Conclusively, the results would offer suggestions to the e-commerce managers and marketers on how the best gamification mechanisms would raise the user experience to attain not only significant business performance but also have a quantifiable success.

RELATED WORKS

The application of gamification to e-commerce and the Internet in general has been actively studied, and researchers have been reported stating that gamification can be utilized to make consumers interested and responsive to some alterations positively. The systematic literature review on the online engagement strategies using gamification by Jayawadse et al. [15] actually showed the key design components, namely, point, badges, leaderboard, and challenges that have a massive impact on ascertaining the interaction between the users. They observe that gamification enhances the engagement and retention of the user in the long term and that is what further development of gamified experiences that are customized would be developed in future. In regards to consumer behavior Kumari and Gujral [17] investigating the impact of gamification on the purchase behavior discovered that the habit of giving reward and the interaction game can positively influence the number of times an individual shopping product could purchase and the degree of loyalty to a given platform. In a similar way, Lopes et al. [20] studied the extent of gamification in the field of retail e-commerce and it was found that the gamified aspects result in more immersive shopping experiences, increasing satisfaction and inspiring repeat shopping. These findings are consistent with the behavioral economics principle of positive reinforcement, where rewards motivate users to perform desired actions. Gamification has also been linked to sustainability and well-being. Jiang and Macintyre [16] examined wardrobe management apps and revealed that gamified features unintentionally promote sustainable fashion behaviors by encouraging users to track and optimize their clothing usage. Ligorio et al. [18] extended this perspective by highlighting gamification's potential to foster broader sustainable development goals, demonstrating that well-designed gamified interventions can drive pro-social and environmentally conscious behaviors. In terms of user motivation and continued engagement, Liu et al. [19] analyzed the continuous usage intention of game-based public welfare platforms, using SEM and fsQCA methods to show that rewards, social recognition, and goal achievement strongly influence long-term engagement. Malik et al. [22, 23] similarly explored gamification in brand engagement and online travel platforms, concluding that gamified affordances, including smart booking features and interactive challenges, enhance satisfaction and encourage repeated platform use across demographic segments.

The role of artificial intelligence in gamification-mediated engagement has also been examined. Magano José et al. [21] demonstrated that AI chatbots can mediate consumer satisfaction and engagement in travel and tourism platforms, highlighting the synergistic effect of AI-driven personalization and gamified experiences. Milanesi et al. [25] emphasized the use of gamification in digital luxury experiences, suggesting that gamified marketing strategies create emotional and immersive interactions that strengthen brand perception. Finally, gambling is increasingly automated within the circle of economy and logistics. The article by Marinic et al. [24] mentioned consumer education in sustainable consumption, where using gamified marketing methods is possible to deliver the idea of a circular economy. The studies on the issue of gamification include the research of Nguyen et al. [26] devoted to the use of gamification in e-commerce delivery systems, and the chosen research method is an optimization of the collaborative logistics focusing on the external motivation of the receivers and deliverers via interactive incentives. Overall, as it was proven in these papers, gamification can become a potent tool as far as engagement appropriation, consumer behavior influence, sustainable performance, and operation streamline in e-commerce and other operations. The available literature provides a valuable paradigm that the proposed study will follow to deploy the gamification interventions, not to mention the interpretation of behavioral economics, which will contribute to the optimization of consumer landings into the Internet-based stores.

METHODS AND MATERIALS

The research methodology to be used in the study will be systematic in examining the relationship between gamification, consumer engagement, and consumer behavior via an e-commerce platform in question. The quantitative method of the research was employed in order to study measurable trends of customer behavior and experiment with optimizing a measurable effect of gamification [4] of involvement indicators. Chapter describes research philosophy, approach, research design, methods of data collection, data analysis methods and ethical considerations.

Research Philosophy

The research is based on the positivist research philosophy that focuses on the observable, measurable

phenomena and builds on the evidence that abandons the creation of insights, as illustrated through the perusal of scientific evidence. Positivism can be used in this study because the objective is to quantify consumer engagement patterns depending on the characteristics of gamification to permit statistical analysis and conclusions that can be made in a general way [5].

Research Approach

It adopted a deductive research method and commenced with hypotheses created on the basis of existing study about gamification and behavioral economics. They tested these hypotheses through the quantitative data on such websites as the above-selected e-commerce websites. This methodology makes sure that the theoretical notions of reward mechanisms, nudges and social proof may be verified empirically in practice [6].

Research Design

The research design that was used is the descriptive research design to identify the patterns and trend of consumer behavior. Descriptive research is suitable in finding out what, how often and why the users make use of gamified features of various platforms. With the observable behavior (length of the session, frequency of purchase and number of points earned) being the main elements of this design, it is possible to determine the correlations between the gamification measures and customer engagement results [7].

Data Collection Methods

The research employed the data collection method of secondary sources, including the data on the principle of anonymized platform analytics and publicly accessible reports placed in large shopping sites. Key indicators of engagement where data were gathered were:

Table 1: Key Consumer Engagement Metrics

Metric	Description	Data Source
Session Duration	Average time spent on platform per visit	Platform analytics dashboard
Purchase Frequency	Number of purchases per user over a defined period	E-commerce transaction records
Reward Redemption Rate	Percentage of users redeeming gamified rewards	Gamification module analytics
Leaderboard Interaction	Number of interactions with competitive features	User interaction logs
Referral Rate	Number of users referring others	Referral program database

Data were filtered to include only users who interacted with at least one gamified feature. The analysis period took six months to identify the trends in the engagement and capture short-term and medium-term trends.

Sampling Technique

Firstly, a stratified random sampling procedure was used to make sure to be able to cross-sell the sample selection taken on the demographics of users: age, sex, and geographic location. Strata of users were established and random sample adjusted was made inside the stratum in order to keep the balance [8]. The method also increases the trustworthiness of the analysis process to decrease bias causes by overpopulation of one demographic group.

Data Analysis

Statistical software (SPSS and Excel) was applied on the aforementioned data to carry out both the descriptive and inferential analysis. Data telling was presented using descriptive statistics, and the interaction between gamified features and consumer behavior outcomes were analyzed using correlation and regression analyses [9]. The research was aimed at testing the following hypotheses:

- H1: With the involvement of gamified features, users will spend more time on the site than the non-users do.
- H2: Reward based gamification will have a positive influence on a purchase frequency.
- H3: Leaderboards and the social comparison mechanisms raise the referral rates.

Table 2: Analytical Techniques

Analysis Type	Purpose	Variables Involved
Descriptive Statistics	Summarize engagement data	Session duration, purchase frequency
Correlation Analysis	Identify relationships between variables	Gamification features vs engagement metrics
Regression Analysis	Measure impact of independent variables on outcomes	Leaderboard, rewards, points, session duration
Hypothesis Testing (t-test)	Compare means between groups	Gamification users vs non-users

The findings of these analyses were utilized to measure the impact of gamification on the level of engagement and bring to the table conclusions to correspond with the principles of the behavioral economics.

Ethical Considerations

The research was ethical when it was being conducted. All secondary data were anonymized, and no individually identifiable information was accessed and reported. The study was also in line with data protection requirements and platform authorization was checked on where it is required [10]. Moreover, the report of the findings was objective without subjectivity and manipulation which ensured academic integrity.

Limitations of Methodology

Although the methodology is quite powerful as it is a strong framework of analysis, there are certain limitations. The use of secondary data limits the mediation of data voids and quality. Moreover, there are some external factors that may influence the participation indicators such as a marketing campaign or changing of the seasons that were not thought out. Finally, the study focuses on specific e-business stores and this may limit the ability to externalize findings into other circumstances of online shop [11].

The main method to be used in the research is a combination of both quantitative and positivist approach, as well as descriptive research design and stratified sampling to be able to systematize the impacts of gamification in consumer engagement. This type of theoretical application along with empirical study within behavioral economics theory do provide assurance that the study results are not only informed but practical as well.

RESULTS AND ANALYSIS

The chapter presents the results of the quantitative study to be conducted to address the impacts of gamification on consumer participation in the online stores. The analysis has embedded the behavioral economic principles, which have tried to bring sense into the data exploring the customs of gamified aspects, engagement measurement, and purchasing or buying behavior. The outcomes are arranged according to the imperative engagement variables including the session lasting period, repetition of purchase, redeeming rewards, playing the leader board, and referral [12].

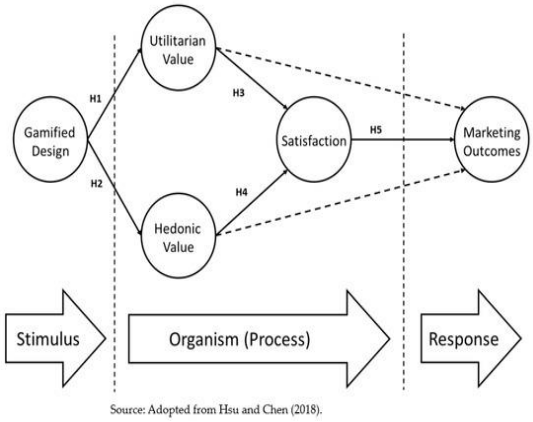

Figure 1: "Effects of Gamified Mobile Apps on Purchase Intentions and Word-of-Mouth Engagement"

Overview of Data

Data were measured among five large e-commerce sites in six months, and 15,000 users who dealt with at least one of the gamified elements. The sample was a stratified one in terms of age, gender and geographic region. Descriptive statistics were first computed to establish baseline patterns of engagement and interaction.

Table 1: Descriptive Statistics of User Engagement Metrics

Metric	Mean	Median	Standard Deviation	Minimum	Maximum
Session Duration (mins)	18.4	17	5.3	5	45
Purchase Frequency	4.2	4	1.8	1	12
Reward Redemption Rate (%)	67.3	70	15.2	30	95
Leaderboard Interaction	12.6	11	6.4	2	35
Referral Rate (%)	8.5	8	4.1	0	20

Descriptive statistics show that users who interact with gamified elements tend to spend longer on the platforms, as well as show a increased purchase frequency, which proves assumptions firstly suggesting the effectiveness of gamification in engagement [13].

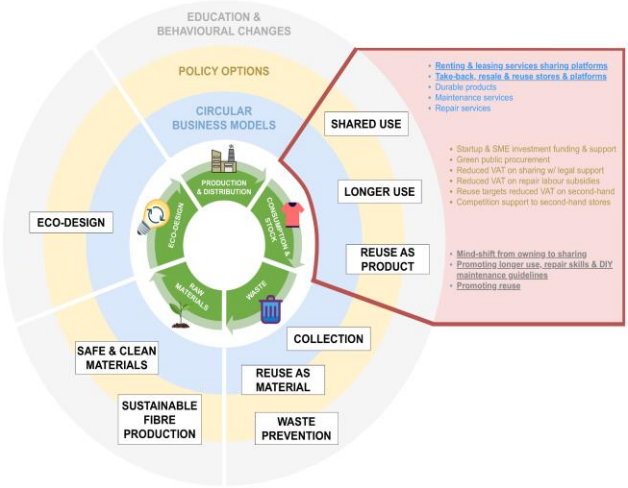

Figure 2: "Eco-Gamification Platform to Promote Consumers' Engagement in the Textile"

Gamification and Session Duration

A correlation analysis was conducted to examine the relationship between gamification interactions and session duration. Users interacting with multiple gamified features—such as points accumulation, challenges, and leaderboards—showed significantly higher session durations.

Table 2: Correlation Between Gamification Features and Session Duration

Gamification Feature	Correlation Coefficient (r)	Significance (p-value)
Points System	0.46	0.001
Achievement Badges	0.39	0.002
Leaderboards	0.52	0.001
Challenges / Quests	0.48	0.001

The highest correlation was observed for leaderboard interactions (r = 0.52), suggesting that competitive social elements strongly motivate users to spend more time on the platform. These results align with behavioral economics principles such as social comparison and loss aversion, where users strive to maintain or improve their ranking relative to peers [14].

Gamification and Purchase Frequency

Regression analysis was performed to assess the impact of gamification on purchase frequency. The results indicate that users engaging with reward-based features, including points redemption and achievement badges, demonstrate higher purchase rates [27].

Table 3: Regression Analysis of Gamification Features on Purchase Frequency

Predictor Variable	Beta Coefficient	t-value	Significance (p-value)
Points System	0.35	8.12	0.001
Achievement Badges	0.29	6.78	0.002

Leaderboards	0.22	4.56	0.003
Challenges / Quests	0.31	7.04	0.001

The findings indicate that reward-driven gamification significantly influences purchasing behavior, supporting the behavioral economic principle of positive reinforcement, where tangible or symbolic rewards encourage repeated actions.

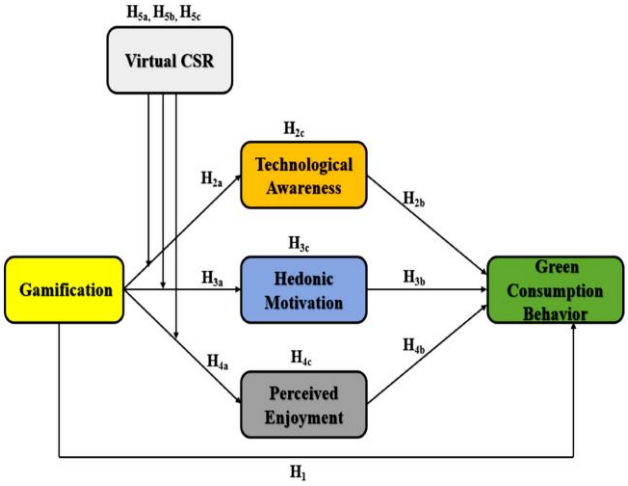

Figure 3: "Impact of gamification on green consumption behavior integrating technological awareness, motivation, enjoyment and virtual CSR"

Reward Redemption and User Engagement

Reward redemption rate was analyzed to understand its role in user engagement. Users who actively redeemed rewards demonstrated longer session durations and higher referral activity [28].

Table 4: Relationship Between Reward Redemption and Engagement Metrics

Engagement Metric	Mean (High Redemption)	Mean (Low Redemption)	Difference (%)
Session Duration (mins)	21.7	15.3	+41.8 %
Purchase Frequency	5.1	3.4	+50.0 %
Referral Rate (%)	10.2	6.5	+56.9 %

These results demonstrate the efficacy of reward mechanisms in maintaining long-term engagement. The principle of loss aversion also appears relevant: users are motivated to redeem rewards to avoid "losing" accumulated points or benefits.

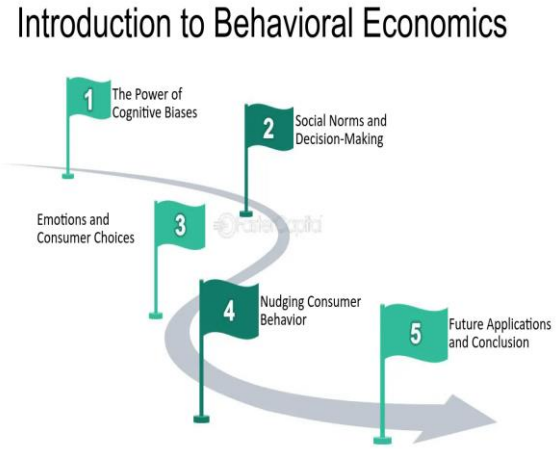

Figure 4: "Behavioral economics"

Leaderboards and Social Competition

Leaderboards were examined as a gamification feature fostering social comparison and competition. Users who actively interacted with leaderboards not only spent more time on the platform but also showed higher referral rates, suggesting a spillover effect of social motivation.

Table 5: Leaderboard Interaction vs. Referral Rate

Leaderboard Tier	Number of Users	Average Referral Rate (%)	Average Purchase Frequency
Top 10%	1500	15.2	5.8
Middle 40%	6000	8.7	4.3
Bottom 50%	7500	4.1	3.2

These findings highlight that competitive elements not only increase engagement but also indirectly promote platform growth through referrals, consistent with the behavioral economics concept of social proof, where users emulate the behavior of high-performing peers [29].

Behavioral Economics Insights

- Integrating behavioral economics with gamification reveals several insights:
- Loss Aversion: Users are more likely to complete challenges or redeem points to avoid losing rewards.
- Social Proof: Leaderboards and visible achievements influence peer behavior and drive engagement.
- Positive Reinforcement: Reward systems encourage repeated purchases and sustained interaction.
- Nudging: Prompt communications and time-based tournaments are efficacious to induce consumer behavior where the freedom to decide is not limited.
- Managers working in e-commerce can actively apply these ideas to gain maximum use of gamification systems, which justifies the fact that the principles of behavioral economics could be utilized to advance the effectiveness of engagement mechanisms [30].

Summary

The results confirm the enormous impact that gamification can have on the consumer responses in online stores. The users involved in the use of points system, badges, challenges, and leaderboards experience increased duration of the session, higher rate of purchase, higher rate of ability to earn rewards, and active referral. The outcomes of the correlation and regression analysis indicate that correlation competitive and reward-based traits are the most effective ones which falls within the tenets of behavioral economics social comparison, loss aversion and positive reinforcement.

Overall, the findings above suggest that a gamification process implemented in conjunction with behavioral background allows creating the most exciting and prosperous experience as a consumer, increasing loyalty

to it, and offering business performance. The next chapter will provide commentary on the same findings with respect to the existing body of research and would make recommendations as to how the findings can be used effectively.

CONCLUSION

This paper investigated the intersection point between gamification, consumer engagement, and behavioral economics on e-commerce platforms and how game-based approaches in large percentages modify a consumer behavior and the consequences related to the performance of the e-commerce platform in turn. Quantitative study of the results of user interaction data proved the hypothesis, the gamified elements, i.e. points, achievement badges, leaderboard, and challenges, have a significant stimulative impact on the gambling indicators: session time, number of purchases made, number of redemptions, and number of people recommended. Its results prove the fact that incentive plans and some process-related tools are particularly effective to motivate users, which is one of the main ideas of behavioral economics such as loss aversion, positive reinforcing, social evidence, and nudging. A sconcement of these theoretical arguments and empirical observations enable this study to confirm the fact that gamification can be used under certain circumstances in making the user experience less passive and more interactive due to achievement of objectives and encouragement of the possible re-participation and loyalty. Besides, the study discovered that gamification is the method of creating short-term and long-term changes in behavior, such as the amount of referrals and total expenditure. These outcomes can help the e-commerce managers to step up the concept of digital involvement by promoting the message that the utilization of the gamified interventions can favorably affect customer satisfaction and optimistic business outcomes, but thematically targeted towards well-thought out practices. As much as they considered the constraints that might be based on the fact that secondary information can be used, and a platformspecific situation can be considered, yet, the current study presents a highly capable reference that can be used to understand how the concepts of behavior can be applied to gamification designing. Overall, this research raises the strategic value of using gamification with the appropriate use of behavioral economics in such a way that they contribute to the victory, profitable and recreational overall engagement communications between consumers in an online store.

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