

Intrinsic motivation as a pathway from gamification to user engagement in mobile tourism apps: A gender moderated model

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Abstract: This study examines the direct impact of game elements on intrinsic motivation and how intrinsic motivation influences user behaviors, specifically engagement and user-generated content, within tourism and hospitality review platforms. It also investigates gender as a potential moderator in the relationship between game elements and intrinsic motivation. Intrinsic motivation is characterized by psychological needs such as relatedness, autonomy, mastery, and purpose. Findings reveal that game elements positively influence intrinsic motivation, which in turn increases user engagement. Enhanced engagement subsequently leads to more user-generated content. The study further indicates that gender does not significantly moderate the relationship between game elements and intrinsic motivation. These results highlight the importance of motivation-oriented gamification design in digital platforms, as such elements can boost users' intrinsic motivation and positively affect their behavioral intentions. The research offers practical implications for platform developers and suggests future directions to improve user behavior in Lebanon. It emphasizes the need for strategic gamification approaches to optimize user engagement and content creation within tourism and hospitality review systems.

Keywords: *Game elements, Gamification, Gender, Intrinsic motivation, User engagement, User-generated content.*

1. Introduction

Have you ever collected badges on a travel app to check into local spots? Have you ever booked a hotel room through an app or written reviews of local eats and earned points for a free stay? These gamified elements demonstrate why gamification has become a core aspect of tourism research and practice [1]. In recent years, platforms like TripAdvisor and Airbnb have utilized such elements to encourage tourists to share their experiences with a broad and diverse user base [2]. Still, the increasing popularity of games generates significant interest among instructional developers [3].

Previously, technological developments and digital transformation have revolutionized the way the tourism and hospitality industry is marketed [4]. As stated by Reportlinker [5] the global gamification market was valued at \$13.55 billion in 2024 and is estimated to grow to \$82.51 billion by 2034. In the tourism sector, gamification has been defined as a process that combines augmented reality, virtual reality, and 3D technologies to create an immersive and entertaining experience of tourist attractions [2], and it has gained significant momentum in the development of mobile apps in diverse sectors, including tourism [6]. It aims to enforce the playful-loving nature of human beings, enabling users to engage in the activity itself and develop a long-term gamified experience [7]. This persuasive strategy of gamification involves gameplay mechanics known as affordances [8], which generate psychological and behavioral outcomes [9]. Psychological outcomes include intrinsic motivation supported by core psychological needs: relatedness, autonomy, mastery, and purpose. Scholars argue that the need for purpose is a fundamental driver of motivation, especially in the context of gamification [2]. Furthermore, according to the Unified Theory of Acceptance and Use of Technology, Koivisto and

Hamari [10] suggested that gender differences have been found to play an important role in online digital gaming activities. Recently, it has been indicated that tailoring gamification to gender preferences is essential for boosting user engagement while offering gamification elements to the target audience [11]. In addition, a study related that tourists' profiles linked their gender to their experiences and behavioral intentions [12]. Although some studies have examined gamification applications in hospitality and tourism settings, this approach is still evolving with a narrow focus [13]. In addition, based on a technology affordance perspective, the implementation of effective gamification mechanisms still lacks an in-depth understanding [14]. Moreover, evidence regarding the effect of gamification on intrinsic motivation is inconsistent [15]. Furthermore, researchers have recommended testing gender differences among tourism game players and investigating whether players' experiences and motivations change after the destination experience in gamified platforms [16]. Recently, studies have explored the significance of including gamification in Lebanese digital marketing, as enhancing gamified experiences and businesses increases Lebanese audience participation in mobile app services and enables the collection of valuable data in Lebanon's dynamic digital landscape [17].

Therefore, in line with calls for further research concerning the topic of gamification in the hospitality and tourism sector [2], this research aims to answer the following questions: (1) To what extent do different game elements affect users' intrinsic motivation? (2) To what extent does intrinsic motivation affect user engagement? and (3) Does the moderating role of gender indicate any major impact on the relationship between game elements and intrinsic motivation?

The remainder of this paper is organized as follows: The theoretical foundations are presented in section two. The methodology is addressed in section three, followed by the results in section four. Discussions and implications for theory and practice are then discussed in section five, followed by the conclusion.

2. Literature Review

2.1. Gamification

Gamification is the process of using game elements and mechanics, known for their ability to motivate and engage players over extended periods, and applying them to non-game contexts [3]. These affordances are considered the stimuli that evoke users' needs and psychological states [18-20]. It starts from the use of game design elements in an attempt to boost the emergence of gameful experiences by adding affordances to the service [18]. Game design elements involve achievement/progression elements (points, challenges, tasks, leaderboards, goals, rankings), social elements (friending, commenting, liking, cooperation, competition), and immersion elements (avatar, character, virtual world); thus, achievement/progression elements are the most common way used to gamify activities [9]. Gamification consists of three main parts, which are: (1) the motivational affordances, (2) the psychological outcomes, and (3) the behavioral outcomes [21].

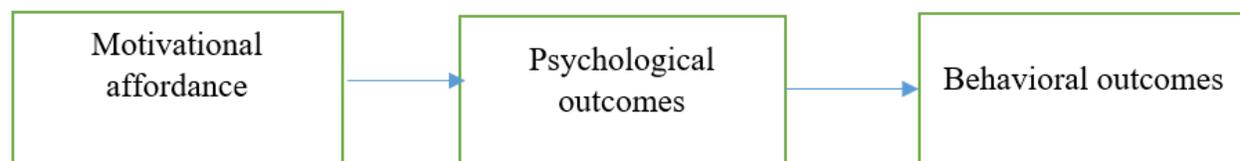


Figure 1.
Overall concept of gamification.
Source: Hamari, et al. [21].

2.2. Intrinsic Motivation

The positive potential of human nature is reflected by intrinsic motivation [22, 23]. Intrinsic motivation occurs when humans are motivated by personal satisfaction instead of external factors such as pressures and rewards [24]. Based on SDT, previous studies proposed the drive framework of

motivation [25], which states that autonomous forms of motivation, where individuals behave with a full sense of choice, depend on autonomy, mastery, and purpose. Merging self-determination theory with the drive framework of motivation, Marczewski [26] proposed the intrinsic motivation R.A.M.P., which analyzes four intrinsic motivators: relatedness, autonomy, mastery, and purpose. These drivers are crucial for the optimal human experience in gamification contexts [27] and are the cornerstone of all successful gamification systems [26]. Previous literature defined these four intrinsic motivators as follows: autonomy is “the individual’s experience of his/her behavior as choiceful” [28] mastery is defined as “the experiencing of one’s behavior as effective [29]; relatedness is “the feeling of connection with others” [30]; and finally, purpose is defined as “the individual’s desire to do something that has meaning” [25].

2.3. From Self-Determination Theory to Intrinsic Motivation

In this paper, gamification is conceptually linked to self-determination theory (SDT) [23], intrinsic motivation [26], and unified theory of acceptance and use of technology (UTAUT) [31]. Self-determination theory is a broad theory of human personality and motivation, covering how individuals connect with and depend on the social environment [32]. It postulates the basic psychological needs that individuals strive for and need to prosper and grow. Intrinsic motivation occurs when humans are motivated by personal satisfaction instead of external factors such as pressures and rewards [24]. Combining both SDT and intrinsic motivation, Marczewski [26] proposed the R.A.M.P. (relatedness, autonomy, mastery, purpose) to analyze the four intrinsic motivators of human experience. The unified theory of acceptance and use of technology postulates that actual technology use is determined by behavioral intention [33].

Gamification illustrates the role of motivational affordances as a stimuli that evoke users’ needs and psychological states [19]. SDT and intrinsic motivation illustrate the four intrinsic motivators (R.A.M.P) optimal for the gamified human experience [2]. In addition, UTAUT illustrates the moderating effects of age and gender on users’ adoption of new technology in gamification contexts [31], since age and gender differences influence preferences for game elements [34, 35].

Motivational affordances are considered as a stimulus that evokes users’ needs and psychological states [18, 19]. It starts from the use of game design elements in an attempt to boost the emergence of gameful experiences by adding affordances to the service [18]. Game design elements involve achievement/progression elements, social elements, and immersion elements. Achievement/progression elements are defined as the most popular, known, and used game elements in gamified systems, such as badges, medals, points, leaderboards or rankings, progress bars, and boosting difficulty levels [9]. Social elements are mainly features used to enable users’ social interaction [36]. And immersion elements are known as game elements that immerse individuals in an engaging experience [37].

2.4. The Unified Theory of Acceptance and Use of Technology (UTAUT)

One of the most mature streams of information systems research is understanding individual acceptance and use of information technology [38]. It remains one of the most frequently applied frameworks for studying user acceptance of technology [39]. UTAUT has refined important factors and contingencies related to predicting behavioral intention to adopt technology [31]. The theory has been studied by researchers in organizational and non-organizational contexts. It notes that age and gender have moderating effects on users’ adoption of new technology in different settings [31, 33]. In addition, individual characteristics such as gender and age moderate different UTAUT relationships [40]. Similarly, a study on gaming motivations for massive multiplayer online games noted that gender and age differences exist [41, 42].

2.5. Achievement/Progression Elements and Intrinsic Motivation

The application of game elements has revealed promising potential to increase users’ intrinsic motivation and positively affect behaviors [43]. Studies reveal that popular game elements in gamified

systems, such as leaderboards, badges, and challenges, evoke feelings of freedom, allowing users to perceive higher autonomy [44, 45]. In the same vein, achievement and progression-oriented affordances such as leaderboards and rankings encourage feelings of relatedness as they permit users to differentiate others' performances through comparing the number of badges or goals achieved by users with those achieved by others [44, 46-48]. In addition, achievement and progression-oriented affordances allow individuals to experience competence or mastery, as they provide users with affective feedback and information [47]. In a tourism context, game mechanics such as rewards and achievements stimulate intrinsic motivation [49]. Moreover, game design elements such as gifting and features allow app users to help each other, creating a sense of purpose; hence, doing something that has meaning for a larger group [26], especially in tourism and hospitality review platforms where users share their travel experiences [2]. Furthermore, commonly used gamification elements such as leaderboards and levels enhance sensations of capability and accordingly increase intrinsic motivation [50]. Additionally, mechanics such as challenges, badges, and points are employed to improve motivation within the gamified experience [3]. Therefore, the following hypothesis is proposed:

H₁: Achievement and progression-oriented elements in tourism apps positively affect intrinsic motivation

2.6. Social Elements and Intrinsic Motivation

In tourism and hospitality review platforms, social-oriented affordances allow users to join online communities, become proficient in using them, and find the experience enjoyable and intrinsically motivating [2]. When using social-oriented affordances, users experience social relatedness through competing or cooperating with other players, which creates a sense of belonging and enables users to achieve common goals [30, 45, 51]. Likewise, badge group competition promotes competence or mastery, encouraging users to challenge one another to achieve the best results [2, 48]. Similarly, users acquire skills and knowledge concerning the gamified system through communicating with other users, which boosts their accomplishments [44]; therefore, motivational affordances based on cooperation promote a sense of altruistic purpose [52]. In addition, a sense of autonomy rises when users interact with competition as a social design element [44]. In experiential tourism, social elements such as teamwork or visibility of achievement promote intrinsic motivation [49]. Social-related features promote a sense of community and belonging [6], which intrinsically motivate users [53]. The following hypothesis is developed based on the previous literature review:

H₂: Social elements in tourism apps positively affect intrinsic motivation

2.7. Immersion Elements and Intrinsic Motivation

Immersion elements such as personalization and customization promote feelings of autonomy because they allow users to freely choose various aspects of a gamified system and personalize their experience based on their preferences [48]. In addition, actors create their own avatars as their role in the gamified system [54] evokes feelings of social relatedness [46] and creates in the users a sense of purpose [26]. In the same vein, popular game elements included in immersion-oriented affordances, such as storylines or narratives, foster feelings of competence or mastery by using strategies tied to the task themes [46]. Moreover, avatars, narratives, and customization, which are immersion-related elements according to Koivisto and Hamari [9] positively affect the need for autonomy. As activities are divided into small themed steps through storylines or narratives [51], users are capable of achieving large goals by using strategies related to the task themes [55], thus promoting feelings of mastery and revealing greater intrinsic motivation to play [46]. Furthermore, immersion elements activate intrinsic motivation [56]. In the same vein, another recent study showed that storytelling is a game design element that enhances user motivation in the overall travel experience [57]. Based on the literature above, the following hypothesis is proposed:

H₃: Immersion elements in tourism apps positively affect intrinsic motivation

2.8. Intrinsic Motivation and User Engagement

Intrinsically motivated people tend to meet their abilities' demands and seek self-fulfillment through task engagement, demonstrating a greater inclination toward personal growth and achievement [58], which is the result of motivation [59]. In addition, the need for purpose is attached to the feeling that a person is doing something valuable for a team or a community [27]; thus, allowing them to engage in larger groups. Accordingly, intrinsic motivation evokes individual's internal needs, leading to dedication toward a task, which in turn boosts a psychological state of engagement [60]. Furthermore, scholars have declared that intrinsic motivation has a more positive effect on engagement than extrinsic motivation [61], as hedonic elements are considered core to gamification apps in increasing intrinsic motivation and supporting user engagement [50]. Moreover, current research found that altruism is considered a trait in intrinsic motivation, and high-altruism consumers will probably create more positively and negatively branded user-generated video content than low-altruism consumers [62]. Likewise, previous studies examined the impact of altruistic purpose in the context of tourism and hospitality review platforms and found that one of the primary reasons users are engaged and motivated to share their travel experiences is to help others or to do something meaningful [63]. Gamification has demonstrated substantial benefits, as evidenced by successful apps, due to enhanced motivation and user engagement [6]. Therefore, the following hypothesis is proposed:

H₈: Intrinsic motivation positively affects user-engagement in tourism apps.

2.9. User Engagement and User-Generated Content

Psychological outcomes related to gamification act as mediators for behavioral outcomes [18]. Some scholars refer to engagement as actions by consumers on social media, including sharing content and posting user-generated content, in response to interactions with others [64]. Captivated by the content, consumers may propose the service to others; furthermore, positive comments on posts generate positive feelings and empathy among consumers [65]. A previous study on social media behaviors proved that engaged fans on a page lead them to liking and commenting on posts and messages [66]. Another study noted that users engaged in hospitality platforms receive rewards, resulting in a higher intention to create user-generated content [62]. Similarly, gamified tourism apps connect users who share the same interests, allowing them to enjoy the platform, feel motivated toward it, and participate actively [2]. Furthermore, a recent study by Mustak, et al. [67] showed that with the rise of digital interactions, users' engagement increasingly occurs online, leaving a rich data trail including comments, reviews, and shares among individuals. Based on the literature above, the following hypothesis is developed:

H₉: User-engagement in tourism apps positively affects user-generated content.

2.10. The Moderation Role of Gender

The unified theory of acceptance and use of technology states that gender and age have moderating effects on users' adoption of new technology in many settings [31]. Gender is known to moderate games and IT use [34]. Previous studies examined the differences of gender and age in online digital gaming activities [10]. Research showed that users prefer different game elements [68] based on specific individual characteristics such as gender [34].

Previous studies noted that men are more likely to engage in behaviors that promote achievement orientations [41]. Another study on immersion's relationship to enjoyment in gaming found that gender is related to immersion, concluding that men are less likely to become immersed than women [69]. Another study by Polo-Peña, et al. [70] examined the moderating effect of age and gender on the relationship between users' experience of participation and self-efficacy. Additionally, previous studies on social virtual worlds indicate that gender moderates the relationship between perceived benefits and the fulfillment of needs [71]. Moreover, a recent study on immersion's relationship to enjoyment in gaming found that gender influences immersion and concluded that men are less likely to become

immersed than women [69]. Besides, scholars believe that gamification can motivate both genders to learn equally [47]. Therefore, the following hypotheses are developed:

H_{6a}: Gender moderates the relationship between achievement/progression elements and intrinsic motivation.

H_{6b}: Gender moderates the relationship between social elements and intrinsic motivation.

H_{6c}: Gender moderates the relationship between immersion elements and intrinsic motivation.

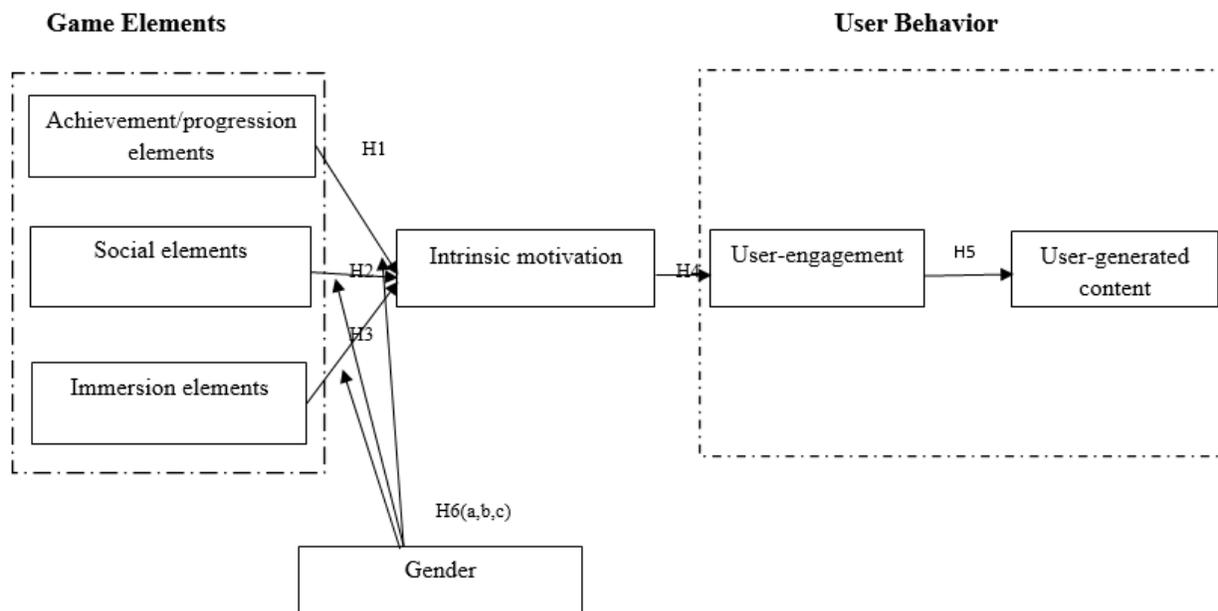


Figure 2.
The conceptual model.

3. Methodology

The unit of analysis in this study comprises all actual users of tourism apps aged between 18 and 64 who have been using tourism and hospitality review apps and who are interested in creating and posting content on these platforms. The researcher gathered 406 responses from Lebanese users of tourism applications. After defining the target population and determining the sampling frame, a pilot study was conducted with a small cohort of 30 participants, yielding promising results. Gamified elements increased intrinsic motivation by 40%. Additionally, 90% of intrinsically motivated users increased their engagement with the app, and 80% were likely to generate content within the app. The researcher adopted a structured survey to achieve the study's objectives. An online closed-ended questionnaire was selected and made available in both English and Arabic. Additionally, a purposive sampling method was used to select respondents who met the predefined inclusion criteria relevant to the unit of analysis [72].

Ethical considerations were strictly observed throughout the research process. Participation was voluntary, and all respondents were informed of the study's purpose, the anonymity of their responses, and the right to withdraw at any point. No personally identifiable information was collected, and data is used solely for academic purposes. Additionally, the study received approval from a research committee and was conducted in accordance with the institution's guidelines for research involving human participants. Despite the study's strengths, it has several limitations. First, while sizable, the sample may not fully represent the entire population of hospitality and tourism app users. Second, reliance on self-reported data may introduce bias, particularly in how respondents interpret their behaviors.

Constructs are measured using a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The questionnaire comprised three sections. The first section included demographic

questions (age, gender, income, education, employment, the tourism app used by users, their experience with hospitality and tourism platforms, and the time spent weekly on these apps). The second section contained scale items for the study variables, which are achievement progression elements, social elements, and immersion elements. The third section included statements on intrinsic motivation. To measure users' interactions with achievement and progression elements, 10 items are used based on Xi and Hamari [44]. To measure social elements, 6 items are used based on Xi and Hamari [44], and to measure immersion elements, 4 items are used based on Xi and Hamari [44]. Intrinsic motivation is measured by four dimensions (Relatedness, autonomy, mastery, and purpose) and 16 items based on Xi and Hamari [44]. The user-engagement scale (4 items) was developed by Xi and Hamari [73] and four items measured user-generated content, adapted from Sigala [74]. The examination of gender as a moderator is expected to assess any influence on outcomes and profile users of tourism and hospitality review platforms. Since these variables are perceptual, reliability and validity analyses are performed.

Table 1.
Characteristics of Respondents (N=406).

		Frequency	Percentage
Age	18-28	141	34.7%
	29-38	134	33.0%
	39-48	98	24.1%
	49-58	26	6.4%
	59-68	5	1.2%
	> 68 years	2	0.5%
Gender	Male	190	46.8%
	Female	216	53.2%
Marital_Status	Single	183	45.1%
	Married	216	53.2%
	Divorced	7	1.7%
Income	Less than 500\$	192	47.3%
	500-1000\$	105	25.9%
	1001-1500\$	26	6.4%
	1501-2000\$	25	6.2%
	2001-2500\$	15	3.7%
	More than 2500\$	43	10.6%
Employment	Employed full-time	240	59.1%
	Employed part-time	80	19.7%
	Retired	6	1.5%
	Seeking Opportunities	31	7.6%
	None	49	12.1%
Educational Level	High School	31	7.6%
	Bachelor	166	40.9%
	Master	158	38.9%
	PhD	51	12.6%
Which tourism app do you usually use?	TripAdvisor	84	20.7%
	Airbnb	48	11.8%
	Wikitravel	42	10.3%
	Others	232	57.1%
How long have you been using these apps?	Less than 6 months	186	45.8%
	6-12 months	25	6.2%
	More than 1 year	56	13.8%
	More than two years	139	34.2%
How much time do you devote to the app each week?	Less than 60 min	361	89.1%
	60-90 min	34	8.4%
	More than two hours	10	2.5%

The online survey was conducted over two months, from January to March 2024. A total of 406 respondents were contacted via email. More than half of the respondents were female (53.2%) compared to males (46.8%). The largest group of respondents was aged between 18 and 28, followed by those aged between 29 and 38, accounting for 33.0%. The smallest age groups were those between 49 and 58, accounting for 6.4%, 59 and 68, accounting for 1.2%, and above 68, accounting for 0.5%. The lower-income group earning below \$500 was the largest, representing 47.3%. Those earning between \$500 and \$1000 accounted for 25.9%, \$1001 to \$1500 for 6.4%, \$1501 to \$2000 for 6.2%, \$2001 to \$2500 for 3.7%, and the highest income group accounted for 10.6%. Most participants were full-time employees (59.1%). Users of the TripAdvisor app constituted 20.7%, Airbnb users 11.8%, Wikitravel users 10.3%, and 57.1% used other tourism apps, as shown in Table 1.

4. Results

To ensure the reliability of the measurement model as well as the evaluation of the structural model and hypothesized relationships, a two-step approach was examined. The two-step approach offers several advantages, especially when applied to tentative theories, as noted by Wong and Yeh [75]. The first step involves verifying the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to confirm the factorial structure and the fit of measurement models before analyzing the structural components. The second step examines the structural equation paths and the relationships between variables [76]. Additionally, this study assesses and evaluates the validity and reliability of the findings by considering all necessary aspects involved in SEM analysis.

4.1. Factor Analysis

A series of EFAs were employed, as presented in Tables 2, 3, 4, and 5, to identify the smallest number of meaningful factors or latent variables that best reproduce the original correlations among a larger set of measured variables. An exploratory factor analysis was conducted for each construct of the theoretical model using ML extraction and direct varimax rotation to explore valid dimensionalities. Additionally, the Bartlett test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were examined. The Bartlett test was significant at 0.001, and the KMO score exceeded 0.95, indicating the adequacy of the sample size and the presence of latent factors. Six factors were extracted from 47 items. These factors included achievement/progression elements, social elements, immersion elements, intrinsic motivation, user engagement, and user-generated content. Cronbach's alpha values for each factor were all above 0.7, confirming the reliability of the measures. These values are as follows: Achievement/progression elements ($\alpha = 0.929$), social elements ($\alpha = 0.918$), immersion elements ($\alpha = 0.876$), intrinsic motivation ($\alpha = 0.940$), user-engagement ($\alpha = 0.894$), and user-generated content ($\alpha = 0.851$) respectively which suggests that the items have relatively very high internal consistency accounting for 58.10%, 8.10%, 5.55%, 52.7%, 75.83%, and 76.34% of the variance.

Table 2.
Exploratory Factor Analysis of Game Elements.

Factors and Items	Loadings	Eigenvalue	% of Variance	Cronbach's α
Achievement/progression elements		11.62	58.10%	0.929
1- I frequently interact with badges/medals/trophies in the app	0.793			
2- I frequently interact with scores/points in the app	0.831			
3- I frequently interact with progress bars in the app	0.817			
4- I frequently interact with rankings/leaderboards in the app	0.708			
5- I frequently interact with increasingly difficult tasks in the app	0.571			
6- It is important to interact with badges/medals/trophies in the app	0.733			

7- It is important to interact with scores/points in the app	0.765			
8- It is important to interact with progress bars in the app	0.73			
9- It is important to interact with rankings/leaderboards in the app	0.665			
10- It is important to interact with increasingly difficult tasks in the app	0.541			
Social elements		1.62	8.10%	0.918
11- I frequently interact with social media elements that evoke competition with other users in the app	0.653			
12- I frequently interact with social networking features in the app	0.662			
13- I frequently interact with elements that evoke cooperation with other users in the app	0.834			
14- It is important to interact with social media elements that evoke competition with other users in the app	0.739			
15- It is important to interact with social networking features in the app	0.724			
16- It is important to interact with social media elements that evoke cooperation with other users in the app	0.685			
Immersion elements		1.11	5.55%	0.876
17- I frequently interact with the user profile/avatar in the app	0.738			
18- I frequently interact with user personalization in the app	0.747			
19- It is important to interact with the profile/avatar in the app	0.779			
20- It is important that apps offer personalization to their users	0.697			

Table 3.
Exploratory Factor Analysis of Intrinsic Motivation

	Loadings	Eigenvalue	% of Variance	Cronbach's α
Intrinsic motivation		8.44	52.7%	0.940
21- I feel that other people in these apps care about what I have to say and what I do	0.643			
22- I feel supported by other app users	0.687			
23- I feel like I am a valuable person to other app users	0.663			
24- I feel that I am understood	0.733			
25- I feel free to participate in these apps	0.749			
26- I feel free to express my ideas and opinions in these apps	0.776			
27- I feel free from outside pressures to participate in these apps	0.784			
28- I feel I can be myself when I participate in these apps	0.772			
29- I think I am pretty good at these apps	0.799			
30- I am satisfied with my performance in these apps	0.795			
31- I feel like an expert in these apps	0.712			
32- I feel like a competent person in these apps	0.729			
33- I aim to make these apps a better website	0.720			
34- I seek to learn so I can help other users	0.683			
35- My current pursuits will help me to contribute to these apps	0.681			
36- I make efforts to promote other app users' well-being	0.667			
KMO = 0.930; Bartlett's Test of Sphericity: $p < 0.001$				

Table 4.
Exploratory Factor Analysis of User Engagement.

	Loadings	Eigenvalue	% of Variance	Cronbach's α
User-engagement		3.03	75.83%	0.894
37- Using gamified elements in tourism apps will increase my interactivity/engagement with apps	0.851			
38- I will participate actively in the app community discussion/activities	0.889			
39- I will thoroughly enjoy exchanging ideas with other people in the app community	0.862			
40- I will be passionate about apps with gamified elements	0.881			
KMO = 0.840; Bartlett's Test of Sphericity: $p < 0.001$				

Table 5.
Exploratory Factor Analysis of User-Generated Content.

	Loadings	Eigenvalue	% of Variance	Cronbach's α
User-generated content (UGC)		3.05	76.34%	0.851
44- I would be willing to write reviews on tourism apps	0.860			
45- I would be willing to post photos and/or videos on tourism apps	0.896			
46- I would be willing to evaluate others' content (e.g., rating reviews) on tourism apps	0.906			
47- I would be willing to update my travel map and profile with travel content on tourism apps	0.830			
KMO = 0.840; Bartlett's Test of Sphericity: $p < 0.001$				

4.2. Structural Equation Model Analysis

Structural equation modeling (SEM) is one of the most popular methodologies in the quantitative social sciences [77]. Given the complex relationships among constructs, SEM estimates causal

relationships among latent variables and tests hypotheses. SEM includes two types of equations: (1) the measurement model and (2) the structural model [72]. The measurement model involves assigning relevant measured variables to each latent construct, while the structural model describes the nature and magnitude of relationships between constructs. The assessment of the measurement model's reliability and validity also applies to SEM. The coefficient alpha is used to evaluate reliability; additionally, composite reliability (CR) is calculated. To assess convergent validity, the size of the factor loadings provides evidence, and the average variance extracted (AVE) is also used for this purpose. The validity of the structural model is evaluated through (1) examining the fit, (2) comparing the proposed model with competing models, and (3) testing structural relationships and hypotheses.

4.3. Measurement Model Evaluation

The final measurement models for all constructs were further examined via confirmatory factor analysis using AMOS 24. As a widely applied technique across various scientific fields, analysts have developed and refined numerous fit indices to assess model goodness-of-fit. There is little consensus on how many fit indices should be reported, which remains an ongoing discussion in the field. Three indicators are reported while presenting SEM according to Schreiber, et al. [78]: The Tucker Lewis Index (TLI), known as the non-normed fit index, should be > 0.90 ; the Comparative Fit Index (CFI) should be > 0.90 ; and the Root Mean Square Error of Approximation (RMSEA), a parsimony-adjusted index, should be < 0.08 , with values closer to 0 indicating a good fit. Meanwhile, Iacobucci [79] recommended using the Root Mean Square Residual (RMR), which measures the difference between residuals of the sample covariance matrix and the hypothesized model; however, it is difficult to interpret. It is better to use the Standardized Root Mean Square Residual (SRMR), which should be < 0.08 [80]. Moreover, the Incremental Fit Index (IFI) is examined as it adjusts the Normed Fit Index (NFI) for sample size and degrees of freedom, which should be greater than 0.90 to indicate a good fit [81].

The chi-square for the three constructs, achievement/progression elements, social elements, and immersion elements, was significant, as was the chi-square for intrinsic motivation, user engagement, and user-generated content. However, with improvements to the initial measurement models, the re-specified CFA models indicated a good fit, with all indices above the suggested cutoff points. Table 6 presents the fit indices results for all the CFA measurement models used in this study.

Table 6.
Fit Indices Results of CFA Measurement Models.

	Criteria									
	χ^2	df	p-value	NCI	CFI	TLI	IFI	RMSEA	NFI	RSMR
Construct			>0.05	<5	>0.9	>0.9	>0.9	<0.08	>0.9	<0.05
APE, SE, and IE	488.03	162	<0.001	3.01	0.95	0.95	0.95	0.07	0.93	0.036
Intrinsic motivation	352.33	87	<0.001	4.05	0.94	0.92	0.94	0.077	0.92	0.035
User-engagement	4.380	2	0.112	2.19	0.997	0.992	0.997	0.054	0.995	0.008
User-generated content	1.007	2	0.604	0.503	0.999	0.999	0.999	0.0001	0.995	0.005

All the fit indices were greater than the recommended thresholds ($\chi^2/df = 3.01$; CFI = 0.95; TLI = 0.95; IFI = 0.95; RMSEA = 0.07), indicating that the data fit the measurement model well for the items representing APE, SE, and IE. The standardized factor loadings for all measurement items were greater than 0.6. Specifically, the loadings ranged from 0.677 to 0.861 for APE, from 0.736 to 0.871 for SE, and from 0.811 to 0.847 for IE, supporting the adequacy of the measurement indicators.

All fit indices exceeded recommended thresholds ($\chi^2/df = 4.05$; CFI=0.94; TLI=0.92; IFI=0.94; RMSEA=0.077; RSMR=0.035), indicating a good fit of data to the items representing intrinsic motivation. All standardized factor loadings were above 0.5, ranging from 0.52 to 0.894.

All the fit indices exceeded the recommended thresholds ($\chi^2/df = 2.19$; CFI = 0.997; TLI = 0.992; IFI = 0.997; RMSEA = 0.054), indicating the data fit well to the items representing user engagement. All the standardized factor loadings were greater than 0.5, ranging from 0.793 to 0.855

All the fit indices exceeded the recommended thresholds ($\chi^2/df = 0.503$; CFI = 0.999; TLI = 0.999; IFI = 0.999; RMSEA = 0.0001), indicating that the data fit well with the items representing user-generated content. All the standardized factor loadings were greater than 0.5, ranging from 0.750 to 0.894.

4.4. Convergent and Discriminant validity

4.4.1. Convergent Validity

To ensure successful convergent validity, each item in the study shared a high proportion of common variance. Convergent validity was examined across three dimensions based on Hair, et al. [82], including factor loadings, average variance extracted (AVE), and construct reliability (CR). Results, shown in Table 7, indicate composite reliabilities above 0.7, which is acceptable, and AVE values exceeding 0.5, with the lowest being 0.5 for intrinsic motivation. All factor loadings were positive and above 0.5, indicating convergent validity, except for item 21, which was deleted to improve validity and discrimination.

Table 7.
CFA factor loadings and descriptive statistics of items.

	Mean	Standard Deviation	Standardized loadings
Achievement/progression elements (CR = 0.939; AVE = 0.609)			
1- I frequently interact with badges/medals/trophies in the app	2.97	0.991	0.734
2- I frequently interact with scores/points in the app	3.08	1.000	0.778
3- I frequently interact with progress bars in the app	3.11	0.959	0.804
4- I frequently interact with rankings/leaderboards in the app	3.27	0.955	0.747
5- I frequently interact with increasingly difficult tasks in the app	3.15	0.917	0.677
6- It is important to interact with badges/medals/trophies in the app	3.11	0.957	0.845
7- It is important to interact with scores/points in the app	3.23	0.965	0.855
8- It is important to interact with progress bars in the app	3.23	0.944	0.861
9- It is important to interact with rankings/leaderboards in the app	3.35	0.933	0.772
10- It is important to interact with increasingly difficult tasks in the app	3.24	0.955	0.710
Social elements (CR = 0.924; AVE = 0.670)			
11- I frequently interact with social media elements that evoke competition with other users in the app	3.15	0.974	0.736
12- I frequently interact with social networking features in the app	3.23	0.936	0.835
13- I frequently interact with elements that evoke cooperation with other users in the app	3.11	0.961	0.811
14- It is important to interact with social media elements that evoke competition with other users in the app	3.16	0.939	0.809
15- It is important to interact with social networking features in the app	3.31	0.903	0.871
16- It is important to interact with social media elements that evoke cooperation with other users in the app	3.24	0.929	0.844
Immersion elements (CR = 0.893; AVE = 0.675)			
17- I frequently interact with the user profile/avatar in the app	3.15	0.930	0.816
18- I frequently interact with user personalization in the app	3.14	0.926	0.847
19- It is important to interact with the profile/avatar in the app	3.12	0.869	0.811
20- It is important that apps offer personalization to their users	3.20	0.888	0.812
Intrinsic motivation (CR = 0.937; AVE = 0.50)			

21- I feel that other people in these apps care about what I have to say and what I do	3.36	0.875	Item 21 has been deleted for validity purposes
22- I feel supported by other app users	3.23	0.847	0.65
23- I feel like I am a valuable person to other app users	3.17	0.882	0.62
24- I feel that I am understood	3.25	0.870	0.70
25- I feel free to participate in these apps	3.49	0.840	0.72
26- I feel free to express my ideas and opinions in these apps	3.47	0.904	0.75
27- I feel free from outside pressures to participate in these apps	3.44	0.905	0.76
28- I feel I can be myself when I participate in these apps	3.41	0.930	0.76
29- I think I am pretty good at these apps	3.51	0.866	0.77
30- I am satisfied with my performance in these apps	3.52	0.848	0.77
31- I feel like an expert in these apps	3.27	0.923	0.67
32- I feel like a competent person in these apps	3.39	0.865	0.70
33- I aim to make these apps a better website	3.38	0.858	0.70
34- I seek to learn so I can help other users	3.57	0.891	0.66
35- My current pursuits will help me to contribute to these apps	3.27	0.889	0.66
36- I make efforts to promote other app users' well-being	3.27	0.885	0.66
User engagement (CR = 0.894; AVE = 0.678)			
37- Using gamified elements in tourism apps will increase my interactivity/engagement with apps	3.37	0.896	0.793
38- I will participate actively in the app community discussion/activities	3.36	0.880	0.855
39- I will thoroughly enjoy exchanging ideas with other people in the app community	3.39	0.884	0.827
40- I will be passionate about apps with gamified elements	3.43	0.908	0.817
User-generated content-UGC (CR = 0.898; AVE = 0.688)			
44- I would be willing to write reviews on tourism apps	3.38	0.913	0.808
45- I would be willing to post photos and/or videos on tourism apps	3.28	0.990	0.850
46- I would be willing to evaluate others' content (e.g., rating reviews) on tourism apps	3.37	0.923	0.894
47- I would be willing to update my travel map and profile with travel content on tourism apps	3.30	0.986	0.760

4.4.2. Discriminant Validity

Discriminant validity was also measured to reflect the extent to which each of the constructs is unique and not redundant with other constructs [83]. The discriminant validity was examined using the Heterotrait-Monotrait ratio of correlations (HTMT), reflecting the average of heterotrait-heteromethod correlations relative to the average of monotrait-heteromethod correlations [83]. Table 9 shows the HTMT assessment results, indicating sufficient discriminant validity with the highest HTMT value of 0.788, below the threshold of 0.90. In a nutshell, the measurement model provided satisfactory construct validity.

Table 8.

Discriminant validity: Heterotrait-Monotrait Ratio Statistics (HTMT).

	APE	SE	IM	IE	UE	UGC
APE						
SE	0.788					
IM	0.682	0.670				
IE	0.730	0.837	0.641			
UE	0.664	0.728	0.826	0.709		
UGC	0.602	0.666	0.695	0.626	0.776	

Note: APE = Achievement/progression elements; SE = Social elements; IM = Intrinsic motivation; IE = Immersion elements; UE= User Engagement; UGC = User-generated content.

4.5. Assessment of Structural Model

After assessing the measurement model for validity and reliability, the structural model was used to test the proposed theoretical model and hypotheses. The model included three independent variables, achievement/progression elements, social elements, and immersion elements, that were hypothesized to directly influence intrinsic motivation. Additionally, intrinsic motivation directly influences user engagement, which in turn affects user-generated content. Finally, gender was postulated to affect the relationship between each game element and intrinsic motivation.

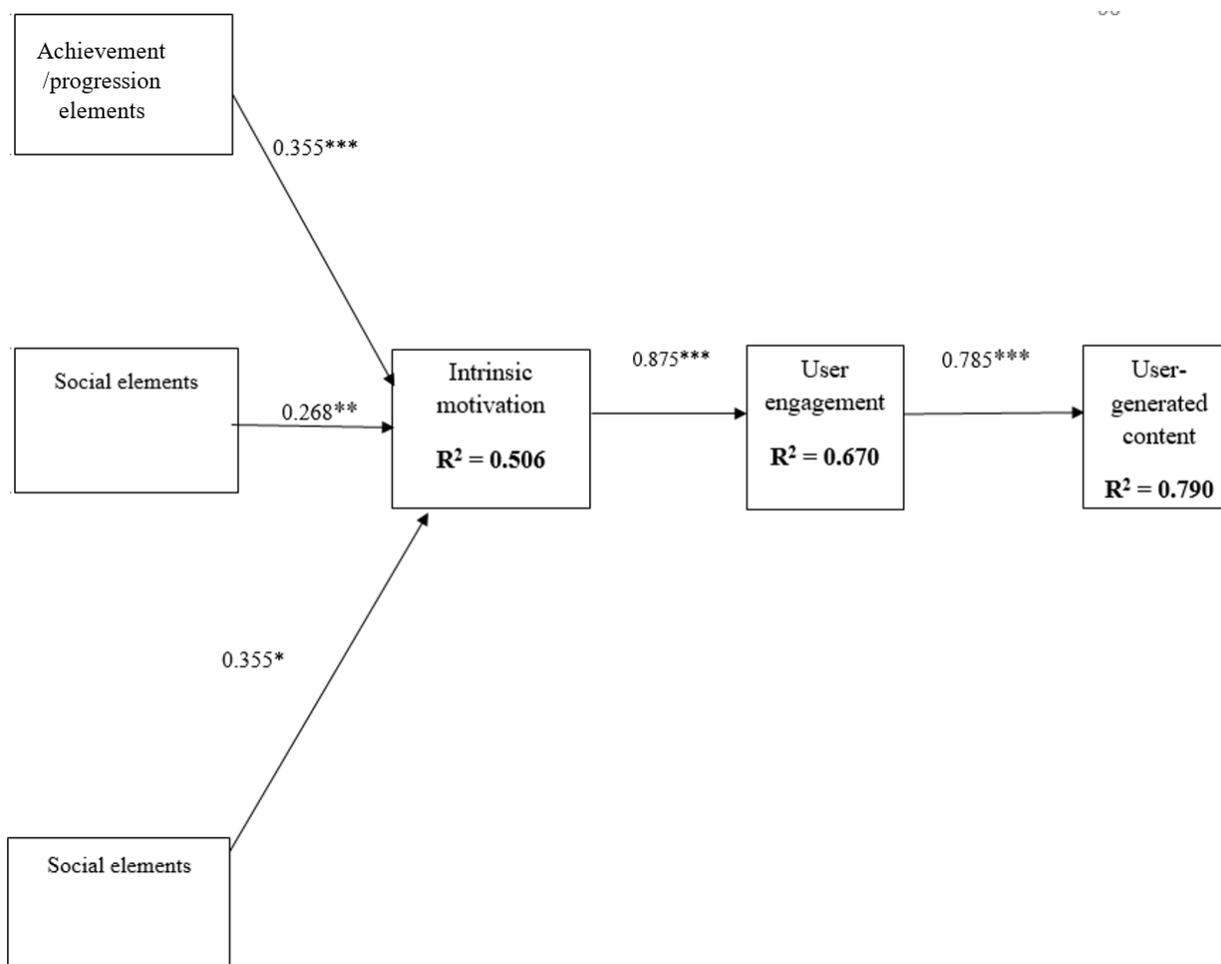


Figure 3.
SEM analysis result for the research model.
Note: *** $p < 0.001$; N.S.: Not Significant.

The structural model is illustrated in Figure 3. The resulting indices were CFI = 0.924; TLI = 0.917; IFI = 0.924; and RMSEA = 0.055. Additionally, the SRMR index was 0.05, which is below the common cutoff value of 0.08. These indices suggest a well-fitting model. The resultant fit indices for gender were as follows: In terms of H6a, there is no statistical difference between male and female (p -value=0.394>0.05); In terms of H6b, there is no statistical difference between male and female (p -value=0.910>0.05); In terms of H6c, there is no statistical difference between male and female (p -value=0.822>0.05).

Figure 3 illustrates the output of the SEM model. The coefficient of determination values range from 0 to 1, with higher values indicating greater predictive accuracy. The model's R-squared values vary between 0.506 and 0.790, suggesting adequate predictive capacity. Specifically, the model accounts for 50.6% of intrinsic motivation, 67.0% of user engagement, and 79.0% of user-generated content.

This study found that game elements are positively and significantly related to intrinsic motivation which are achievement/progression elements ($b = 0.355$; $p < 0.001$) in support of H1; social elements ($b = 0.268$; $p < 0.001$) significantly affect user-engagement, thus, H2 is supported; immersion elements ($b = 0.355$; $p < 0.001$) significantly affect user-engagement, thus, H3 is supported. In addition, intrinsic motivation significantly affects user-engagement ($b = 0.875$; $p > 0.05$); therefore, H4 is supported.

Finally, user-engagement significantly affects user-generated content ($b = 0.785$; $p > 0.05$); thus, H5 is supported.

4.6. Moderation Analysis

Table 9 presents the results of multiple-group analyses to examine whether gender (male vs. female) moderates the relationship between achievement/progression elements (APE), immersion elements (IE), social elements (SE), and intrinsic motivation (IM). No statistically significant difference was found between males and females, with a p-value of 0.113, which is greater than 0.05.

It is shown that: a) gender does not moderate the relationship between achievement/progression elements and intrinsic motivation $b = 0.404$ ($p < 0.001$) for males and $b = 0.329$ ($p < 0.001$) for females. b) gender does not moderate the relationship between social elements and intrinsic motivation for both males $b = 0.307$ ($p = 0.051$) and females $b = 0.280$ ($p = 0.084$). c) gender does not moderate the relationship between immersion elements and intrinsic motivation for either males $b = 0.160$ ($p = 0.295$) or females $b = 0.223$ ($p = 0.056$).

However, no statistically significant gender differences were found in the relationship between social elements (SE) and intrinsic motivation (IM), even at the 10% significance level, as the p-value exceeded 0.10. Accordingly, the moderation hypotheses were rejected. The results further indicate that achievement/progression elements (APE) positively and significantly predicted intrinsic motivation for both males and females, whereas social elements (SE) and immersion elements (IE) exhibited positive but non-significant relationships with intrinsic motivation. Although APE showed the strongest relationship with intrinsic motivation, no significant differences were observed across gender groups.

Table 9.
Results of moderation analysis.

Multiple-group			Male		Female	
			Standardized coefficient	p-value	Standardized coefficient.	p-value
IM	<---	APE	0.404	<0.001	0.329	0.001
IM	<---	SE	0.307	0.051	0.230	0.084
IM	<---	IE	0.160	0.296	0.223	0.066

5. Discussions, Implications, and Conclusion

Earlier studies examined the role of game elements on intrinsic motivation; however, few studies have focused on the role of each game element in extending this to tourism and hospitality review platforms. Additionally, limited research has explored the role of gender in gamified tourism platforms. This study aims to investigate the relationship between game elements identified as achievement/progression, social, and immersion elements and intrinsic motivation. It also explores the relationship between intrinsic motivation and user engagement, as well as the role of user engagement on user-generated content; along with the role of gender as a moderator.

The results showed that out of six hypotheses, five were supported, while one was rejected. The findings revealed that achievement/progression elements, social elements, and immersion elements were significant predictors of intrinsic motivation, which aligns with the previous study by Bitrián, et al. [46], who found that user interaction with these elements helps satisfy users' intrinsic needs in the Fitbit app. Results also align with Bravo, et al. [2], who showed that interaction with gamified elements in TripAdvisor was positively associated with satisfying users' needs. In addition, Bitrián, et al. [84] stated that the interaction with achievement-related game elements satisfied users' needs in sport apps, consistent with our study's findings. However, the relationship between each gamification element and intrinsic motivation is relatively weak, as users may respond differently depending on the game design. For example, Sailer, et al. [54] found that participants in a game involving teammates (social elements) experienced higher levels of connection with others (intrinsic motivation). However, this positive effect was not observed when participants were given the freedom to personalize the experience according to

their preferences. Another study indicated that game elements help increase intrinsic motivation, supporting our results, as gamified elements are considered avenues to satisfy psychological needs, leading to stronger intrinsic motivation” [85]. However, Bitrián, et al. [84] results don’t match our predictions. Their results demonstrated that social-related elements did not affect intrinsic motivation. Additionally, contrary to our findings, they discovered that immersion-related elements also did not influence intrinsic motivation, as the feeling of connection with others does not increase users' intrinsic motivation.

Moreover, the relationship between intrinsic motivation and user engagement is relatively strong, aligning with existing literature. Bitrián, et al. [46] found that gamification increases user engagement by fulfilling psychological needs for competence, autonomy, and mastery. Another study indicated that intrinsic motivation positively influences engagement [86]. Moreover, Hsu [58] examined the impact of gamification mechanics on user engagement and showed that intrinsic motivation positively influenced engagement. Additionally, Bitrián, et al. [46] found that mobile apps must satisfy users’ needs for competence, autonomy, and mastery to foster engagement. These findings align with our study's results.

Another strong relationship exists between user engagement and user-generated content; as user engagement in mobile apps motivates users to act positively with the application, potentially leading them to respond to requests for writing online reviews [87]. A possible explanation for this is that users engaged in gamified apps attempt to visualize their progress, achieve objectives, save money, have fun, and interact with others, thereby generating content. This strong relationship corroborates a previous study examining engagement behaviors on user-generated content websites, which found that engaged users contribute content and enhance the platform's overall value. Such contributions make UGC websites valuable in the eyes of fellow users [88].

Furthermore, the key result pertains to the role of gender as a moderator. Results revealed that gender did not have any significant influence on the relationship between achievement/progression elements, social elements, immersion elements, and intrinsic motivation. However, contrary to our predictions, Denden, et al. [89] found that gender can affect students’ perception of specific game elements. In addition, another study by Zhang, et al. [35] provided insights on the role of gender as a moderator in the gamification context, where scholars demonstrated that gamification mechanisms (achievement/progression elements) depended on gender. Additionally, a recent study on immersion’s relationship to enjoyment in gaming found that men are less likely to become immersed than women [69]. A possible explanation for this might be that “gender is recognized as one of the most significant demographic contingency variables in various decision-making situations” [35]. The discrepancy between the findings of this study and previous research may be attributed to equal opportunities between male and female players or to changing gender roles over time, because when societal perceptions of gender roles increase, traditional gender-based limitations on participation in certain activities may weaken. Therefore, this study's findings reaffirm that each game element impacts users’ intrinsic motivation in tourism apps differently [50]. Contrary to this, gender did not emerge as a significant moderator of the relationship between game elements (achievement/progression elements, social elements, immersion elements) and intrinsic motivation [35, 89]. However, this analysis suggests that game elements may have a relatively consistent impact across genders within the context of tourism and hospitality platforms in Lebanon’s dynamic cultural landscape. The absence of significant gender discrepancies in engagement with gamified tourism platforms might indicate advancing societal norms where gamified travel challenges surpass traditional gender roles, given that the Lebanese tourism sector optimizes digital innovation to increase its heritage. This finding suggests designers should prioritize universal appeal in gamified elements like challenges, rewards, or social sharing. Therefore, apps can meet the needs of Lebanon’s broad population, and improve accessibility and engagement for all genders by focusing on universal design.

The results present potential implications and relevant insights contributing to the construction of a more holistic understanding of gamification adoption in the tourism industry. However, facing

difficulties in developing effective tourism apps, such as balancing revenue with the Lebanese economic situation, competing with global gamified tourism apps, obtaining current tourism data, handling language variations, and facing internet infrastructure challenges requires focus for successful implementation. Therefore, game designers and managers should be able to create local partnerships, use multilingual support, optimize data usage, emphasize Lebanon's uniqueness by revealing its culture, food, nature, or local favorites, and set up a dedicated operation team responsible for the daily management of the gamified hospitality and tourism platforms. Finally, game designers might focus on universal design principles and test the app with diverse user groups to ensure that game elements are effective and enjoyable for all age groups and genders. This might happen through (1) crafting immersive experiences that cater to individual users' needs and preferences by integrating personalized rewards and challenges, (2) using features that focus on tracking progress, including photos and video uploads in order for users to monitor their journey and remain motivated to discover new destinations, (3) creating social experiences like events or contexts to foster community and encourage user interaction, which brings a sense of camaraderie and shared purpose. For example, game designers might increase social experiences through tourism apps by enabling users to discuss travel-related topics, ask questions, and share experiences which give others a glimpse into their activities or sharing content on social media platforms like Facebook and Twitter, (4) implementing challenges, quizzes, or scavenger hunts to encourage players to explore new destinations, such as an "explore" section that offers templates or guidelines to help users create high-quality content, (5) featuring user-generated content on the app's homepage and responding to and commenting on users' contributions to show appreciation and encourage more contributions, (6) establishing clear guidelines and moderation policies to ensure high-quality content creation in marketing campaigns and social media promotions, which increases credibility and engagement.

6. Limitations

Future research should consider examining other potential moderating factors, such as age, personality traits, and experience with tourism apps. It is important to confirm whether age moderates the relationship between game elements and intrinsic motivation and which age category interacts best with game elements. Additionally, for practitioners interested in human motivations, future studies should consider using the Octalysis framework [90] as it analyzes gamification strategies and deepens the understanding of human motivations in tourism and hospitality review platforms. Moreover, conducting a mixed-method approach would be valuable to analyze the effect of game elements on content creation and to incorporate new moderating variables (e.g., age, years of experience, trust) and mediating variables (e.g., autonomous motivation, controlled motivation) into the model, yielding more nuanced responses. Furthermore, the Hexad User Typology has recently been recognized as a significant approach for identifying user preferences regarding game elements; thus, future studies should consider it when examining gamification outcomes [3]. The use of purposive sampling may have introduced selection biases, potentially affecting the generalizability of the findings. Therefore, future research should aim to replicate results using probability sampling methods or employ longitudinal approaches to enhance generalizability and analysis depth. Finally, exploring how cultural context influences gender dynamics in tech tourism would be impactful.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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