Unveiling the Dynamics of User Engagement: Exploring Factors Shaping User Intentions and Return Behaviour in Hotel Gamified Mobile Applications

1. Please provide a one-sentence summary of the main message of the paper, following the title in the opening page of the main document.

This paper recognizes the essential role of mobile applications in the hospitality sector and examines the key factors that significantly impact users' decisions, not only in adopting these apps initially but also in returning to and maintaining their engagement through the application of gamification strategies.

2. Please provide up to five Key Points (in sentences) that are very short descriptions of the main concepts presented in the paper in the opening page of the main document.

1. Understanding Return Behaviour in Technology Adoption: The exploration of factors influencing users' intention to return to hotel gamified mobile applications goes beyond the conventional focus on initial adoption. This study offers a deeper understanding of the continuous usage and return behaviour, which is crucial for businesses in the hospitality sector seeking to build long-term relationships with their customers through mobile applications.
2. Unique Insights into Gamification Elements: The study provides unique insights into the specific gamification elements that significantly influence users' intentions. Understanding the importance of perceived ease of use, enjoyment, and interactivity offers practical guidance for developers and marketers in creating gamified systems that resonate with users and enhance their overall experience.
3. Extrinsic Motivation and Rewards in Technology Adoption: This is particularly relevant in the context of gamified systems, where the incorporation of rewards can play a pivotal role in influencing users' intentions and behaviours.
4. Social Influence Strategies: Practitioners can leverage this insight by incorporating features that promote social interactions within the application. This may include features that encourage users to share achievements, collaborate with others, or participate in social activities within the application.

Abstract

The surge in mobile technologies has prompted extensive research, driven by the widespread adoption of mobile devices and advancements in related technologies. Within the hospitality industry, mobile applications have fundamentally altered consumer behaviour, highlighting the insufficiency of merely establishing a mobile presence for increased engagement. In contrast, the gaming industry has effectively explored factors influencing usage, achieving both engagement and profitability. The evolution of mobile gaming applications suggests ample opportunity for the proliferation of gamified applications. Utilizing quantitative data from 763 mobile users with hotel visitation experience, using CFA the study identifies six factors (i.e. perceived ease of use, perceived enjoyment, interactivity), that collectively play a crucial role in influencing users' decisions not only to initially adopt but also to revisit and sustain their interaction with hotel gamified mobile apps. The research enriches theoretical understanding of mobile use behaviour in the hospitality sector, offering valuable insights for hotel marketers to optimize the design and promotion of gamified mobile applications, thereby shaping users' return behaviour.

Keywords: Mobile Technology, Mobile Games, Gamification, Hospitality, Hotels, Return Behaviour, User Engagement

Introduction

The development and use of the information and communication technologies (ICTs) creates opportunities for businesses and boosts economic development (Boojihawon & Ngoasong, 2018). In the current business environment, mobile applications help travel-related companies provide exciting, interesting, and innovative experiences for their customers (Kuo et al., 2019). Mobile apps are defined as software that is downloadable to a mobile device, which prominently displays a brand identity, often via the name of the app and the appearance of a brand logo or icon, throughout the customer experience (McLean, 2018). Reports suggest that 90% of the travel companies apply a strategic plan for their mobile devices, whilst 84% allocate significant funds in mobile phone technology and 53% of travel vendors feel it is essential to engage their users through mobiles, at all stages of their journey (Tak & Gupta, 2021). However, adopting such technologies alone, may not in itself lead to competitive advantage (Kim & Law, 2015), unless there is a corresponding investment by hotels to enhance engagement.

To enhance engagement, various industries should examine the rapid advancements in the video game industry, as suggested by Cai et al. (2022), for innovative technologies and products (Phillips, 2018). Despite the majority of video players (40%) falling within the 18 to 34 age group, reports show that 27% of players are over 50, resulting in an average player age of 35 (Michelini et al., 2023). This highlights that video games effectively interact and engage individuals across different life stages. According to Xu et al. (2017), the popularity of video games is fuelled by technological developments, including smart mobile devices and internet accessibility, facilitating mobile experiences and dynamic on-site communication..

The proliferation of mobile game applications indicates a potential for the widespread adoption of gamified applications. Gamification is frequently characterized as a method that utilizes motivational strategies to improve services by crafting experiences reminiscent of those encountered in games (Bravo et al., 2021). This phenomenon has gained popularity as a means of customer or staff engagement in multiple industries including education, business, marketing, and health (Brito et al., 2018; Sisson & Whalen, 2022). In the realm of hospitality marketing, gaming and gamification provide marketers with opportunities to create informative and entertaining environments conducive to successful interaction and communication (Xu et al., 2016). However, to realize its benefits, research emphasizes that the effectiveness of gamification depends not only on users' perceptions and behaviour but also on the context in which it is applied (Pasca et al., 2021).

Despite previous research extensively addresses user intentions in mobile commerce (Agrebi & Jallais, 2015; Ozturk et al., 2016; Ambrose et al., 2022), and mobile applications (Morosan & DeFranco, 2016; Chen, Chia-Chen & Tsai, 2019), the exploration of gamification (Yoo et al., 2017; Alibakhshi et al., 2024), particularly within the hospitality industry (Parapanos & Michopoulou, 2022) has been relatively limited. Hence, currently there is inadequate understanding of users' behaviours with hotels' gamified applications. The study's theoretical contribution includes extending the Technology Acceptance Model (TAM) to gamified mobile apps in hospitality, adapting it to a novel context. Additionally, it explores diverse factors like rewards and enjoyment, emphasizing their impact on user behaviour and motivation. Lastly, it

examines return behaviour beyond initial adoption, enriching theoretical understanding of user engagement in gamified hospitality apps. In today's landscape, where the use of mobile apps is no longer a competitive advantage due to the normalization of mobile technology in everyday life (Hafermalz et al., 2020), this research aims to provide insights to hotel marketers for developing mobile applications that enhance return behaviour.

Theoretical background and hypothesis development

Mobile technology

Mobile technologies play a crucial role in enhancing tourism experiences by facilitating the real-time collection and exchange of valuable information (Corrêa & Gosling, 2021). This includes accessing websites for diverse information like weather updates, accommodation details, attractions, transportation options (Kim & Law, 2015), and on-the-go shopping for travel-related services (Ozturk et al., 2016). In recent years, mobile applications have reshaped consumer behaviour in the hospitality sector (Pappas et al., 2019). However, it's now clear that merely having a mobile application is insufficient to boost productivity, efficiency, or gain a competitive edge.

The research interest in mobile technologies has surged alongside the growing prevalence of mobile devices and the maturation of associated technologies (Yan et al., 2022). Influential factors in the mobile market's evolution include wireless devices like smartphones and the expansion of networks connecting these devices to the internet (Laudon & Traver, 2017). Consequently, the increasing significance of mobility and on-the-go apps (Chun-Chi Lu et al., 2017) enables users to access services anytime and anywhere, with mobile payment emerging as a fundamental business component (Yan et al., 2022). For the hospitality industry, mobile devices bring both convenience and ease for modern travellers (Ozturk et al., 2016; Law et al., 2020).

Mobile games

Mobile games appeal to individuals of all ages worldwide due to their convenience and accessibility (Nam & Kim, 2020). While the availability of mobile apps continues to grow, it does not guarantee sustained user engagement (Kim & Preis, 2016). The evolution of mobile games, particularly their introduction and distribution through platforms like the App Store and Google Play, has disrupted traditional retail channels (Su, 2023). Many mobile games are offered for free, with users having the option to make in-app purchases to eliminate ads or unlock additional features (Palmeira, 2021). In 2016, Apple's "App Store" and Google's "Google Play" reported 19.2 billion downloads of mobile games, with users spending an average of $40 per device on premium applications, dominating consumer spending (Douglas, 2019). Over the following years, the gaming industry's significance grew, representing 74% and 72% of all app store spending in 2018 and 2019, respectively, and constituting 33% of total global downloads (Coe & Yang, 2022).

Recognizing that players have the choice not to engage in games, the gaming industry focused on understanding what makes a game engaging and why players choose to interact with it (Morgan McGuire, 2008). Numerous studies (Bartle, 2004; Yee, 2006; Demetrovics et al., 2011; Merikivi et al., 2017; Kahn et al., 2015) have delved into the factors influencing players' intentions to return to a game. The exploration of these factors revealed that gaming can be

highly addictive as players are driven to achieve higher goals, score points against each other, and obtain both material and non-material rewards, such as inclusion in a hall of honour (Xu et al., 2017). Hence, gamers not only invest their time but have also begun to invest money in gaming (Wu, & Andrizal, 2021). Despite a wealth of knowledge regarding gamers' motives and the benefits they derive, it is not directly transferable to gamification (Brito et al., 2018), because games are designed primarily for amusement and while gamification serves a specific function even when traditional gameplay elements are absent.

Gamification

Gamification as originally defined by Deterding et al., (2011) is the use of game mechanics and metaphors in a non-game contexts. Later studies enhanced the definition to include the use of game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems (Parapanos & Michopoulou, 2023). Gamification strives to enhance users' motivation for engaging in activities or utilizing technology, ultimately boosting both the quality and quantity of these activities (Morschheuser et al., 2018). To achieve its objectives, gamification employs various game mechanics, including points, leaderboards, badges, virtual currency, narratives, and avatars (Alibakhshi et al., 2024). Gamified experiences have permeated daily life through mobile applications that use game cards, scratch-off prizes, and adventure-seeking scavenger hunts, appealing to anyone who possesses handheld technology (Sisson & Whalen, 2022).

In the realm of tourism, gamification leverages technologies like virtual and augmented reality to create immersive and enjoyable experiences for tourist attractions (Bravo et al., 2021). However, the hospitality industry often leans on game mechanics such as points and badges to engage users, although this may not be adequate to consistently sustain individuals' interest (Al-Zaidy, 2012). Wang et al. (2022) acknowledges the connection between gamification and intrinsic motivation but notes that organizations frequently prioritize mechanics and tasks like challenges, goals, and points.

In the hospitality sector, there is a tendency to oversimplify gamification by focusing on specific game mechanics tailored to address particular motives like competitiveness and achievement. This approach may inadvertently neglect users who engage with technology through different mechanics for enjoyment (Chou, 2020). Hasan et al. (2019) recognize the diverse motivating factors for technology adoption, emphasizing that users are likely to engage with various game mechanics.

Integrating game mechanics into a mobile application serves as a valuable tool to enhance engagement between the system and the user while assisting users in achieving their objectives. However, Marczewski (2014) emphasizes the importance of knowing the target users in gamified technology to create a more engaging experience. Despite the significant benefits that mobile applications bring to consumers, there has been limited research on the factors that may influence the use and return to these applications (Kuo et al., 2019). Particularly in the context of gamification, Tan (2018) argues that there is limited empirical evidence and an insufficient understanding of why people use gamified technology.

Hypothesis Development

A theoretical framework (Figure 1) has been developed to understand the current research landscape on factors influencing the adoption of hotel gamified mobile applications and to examine studies investigating intentions to use this technology. Among the various models utilized to study the acceptance of new technologies, the Technology Acceptance Model (TAM) stands out as one of the most widely employed frameworks, validated by numerous empirical studies (Yan et al., 2022; Venkatesh, 2000; Hamari & Koivisto, 2015; Go et al., 2020; Li et al., 2024). Originally applied to information technology adoption (Okumus & Bilgihan, 2014), TAM is now frequently utilized in studies focusing on mobile adoption (Hasan et al., 2019). Despite its prevalence in predicting the intention to use technology within the hospitality context (Yoo et al., 2017; Yang et al., 2017), TAM-based models have yet to be applied to gamified mobile application technology within the hospitality sector.

Perceived usefulness, perceived ease of use and intention to use hotel gamified applications

Key variables that influence decision-making in the TAM model, namely perceived usefulness (PU) and perceived ease of use (PEOU), are incorporated as our focus is on explaining users' choices to adopt information technology (Yan et al., 2022). The original TAM underscores a cognitive process in human technology acceptance, with PU and PEOU serving as primary determinants, a pattern observed in many other TAM studies (Viviane & Susana Regina Bacelar de, 2022; Go et al., 2020). Existing research indicates a positive relationship between perceived ease of use and perceived usefulness with the intention to use mobile payments (Venkatesh, 2000). In the hospitality context, a study by Chen, Chia-Chen & Tsai (2019) found that perceived ease of use and perceived usefulness significantly influence the intention to use Personalized Location-based Mobile Tourism Application (PLMTA). Similarly, a study by Li et al. (2024) yielded comparable results regarding the intention to adopt mobile technologies in tourism and hospitality. We thereafter propose the following hypothesis:

Hypothesis 1. There is a positive relationship between perceived usefulness (PU) and intention to use hotel gamified mobile applications (ITU-HGMA).

Hypothesis 2. There is a positive relationship between perceived ease of use (PEOU) and intention to use hotel gamified mobile applications (ITU-HGMA).

Perceived enjoyment and intention to use hotel gamified applications

Perceived enjoyment is defined as the extent to which using technology is perceived to be pleasurable, irrespective of the perceived outcome performance (Yu et al., 2024). Literature in technology acceptance has consistently demonstrated the importance of perceived enjoyment concerning customers' intentions to use new applications (Liebana-Cabanillas et al., 2020).

Positive relationships between perceived enjoyment and the intention to use technology have been affirmed by studies conducted by Gurtner et al. (2014) and Agrebi & Jallais (2015). In the field of tourism, perceived enjoyment has been tested and shown a significant positive effect on the reuse intention of technology (Yu et al., 2024) and the adoption of tourist near field communication applications (Liebana-Cabanillas et al., 2020). Therefore, we propose the following:

Hypothesis 3. There is a positive relationship between perceived enjoyment (PE) and intention to use hotel gamified mobile applications (ITU-HGMA).

Reward and intention to use hotel gamified applications

Extrinsic motivation, as noted by Mitchell et al. (2020), is a potent driver of behaviour, representing actions individuals take to acquire rewards or avoid punishment (Van den Broeck et al., 2021). Previous research indicates that extrinsic motivators can significantly influence system-use behaviour (Wu & Lu, 2013). Hansen & Levin (2016) discovered that extrinsic motivation positively impacts a person's intention to use technologies. In the realm of gamification, Adam et al. (2023) found that reward-based technology designs are more likely to boost user registrations compared to non-gamified reward designs. Additionally, Altin Gumussoy (2016) demonstrated that extrinsic motivation has a positive effect on the intention to use online games. We assert that extrinsic motivation, in the form of a reward, will enhance users' intention to use hotel gamified mobile applications.

Hypothesis 4. There is a positive relationship between reward (R) and intention to use hotel gamified mobile applications (ITU-HGMA).

Social influence and intention to use hotel gamified applications

Social influence refers to the extent to which an individual places value on others' opinions regarding whether they should adopt a new system (Jeng & Tzeng, 2012). In technology adoption, social influence has become a noteworthy factor in research (Joa & Magsamen-Conrad, 2022). For instance, the correlation between social influence and travel behaviour has been increasingly explored in transportation research (Manca et al., 2019). Social influence assesses users' perceptions of how their social environment will view their behaviour concerning technology adoption and use (Joa & Magsamen-Conrad, 2021). Workman (2014) found that greater social influence leads to increased use of smart applications. In the realm of gamification, a study by Hamari & Koivisto (2015) identified that social influences are a significant factor influencing intentions to use.

Hypothesis 5. There is a positive relationship Social Influence (SI) and intention to use hotel gamified mobile applications (ITU-HGMA).

Personal innovativeness and intention to use hotel gamified applications

Personal innovativeness is viewed as a personality trait that describes an individual’s propensity to adopt new technology (Twum et al., 2022). (Hong et al., 2017) defines personal innovativeness as the degree of speed and willingness of an individual to adopt new ideas against other members of the social system. (Mayasari, 2015) adds that people who have high personal innovativeness in technology will continue to seek the most current information on how to use a new technology. (Madan & Yadav, 2018), highlight the importance of personal innovativeness as a relevant factor minimizing the risk of failure associated with new products

or technologies. For example, (Twum et al., 2022) found that personal innovativeness in information technology, have a significant effect on the intention to use E-learning. Studies by (Thakur & Srivastava, 2015) and (Madan & Yadav, 2018) show a positive link between personal innovativeness and intention to shop online. Therefore, we propose the following:

Hypothesis 6. There is a positive relationship between personal innovativeness (PI) and intention to use hotel gamified mobile applications (ITU-HGMA).

Interactivity and intention to use hotel gamified applications

In information systems literature, interactivity is defined as interface features enabling users to make real-time changes to the system (Chen, Cheng et al., 2023). Barry & Doherty (2017) assert that interactivity is pivotal to digital communications and their adoption. Lee et al. (2018) presented in their study that interactivity has a positive influence on purchase intention, contrary to previous empirical support on the topic. Similarly, Go et al. (2020) emphasize the need for experimental studies measuring the impact of interactivity on the intention to use advanced technology. For instance, a study by Etemad-Sajadi (2016) demonstrates a positive effect between online real-time interaction and the intention to use an information system, enhanced by interactivity and the use of an avatar. Considering that users appreciate the interactivity afforded by technology (Chen, Cheng et al., 2023), we propose the following:

Hypothesis 7. There is a positive relationship between interactivity (I) and intention to use hotel gamified mobile applications (ITU-HGMA).

Intention to use hotel gamified applications and intention to return to hotel gamified applications

The acceptance of new or different technology by consumers can be elucidated by their individual attitudes toward the use of technology (Rivera et al., 2015). Nelwan et al. (2021) define intention to use as users' readiness to perform certain behaviours, assumed to be a direct antecedent of actual behaviour. A study by Tseng et al. (2022) examined the intention to reuse shopping mobile applications, revealing a positive relationship with perceived values and perceived satisfaction. In the context of tourism, İlkan et al. (2023) investigated the intention to reuse mobile applications, finding a negative relationship with perceived value and a positive relationship with perceived satisfaction. Alalwan (2020) acknowledges that most previous studies on mobile apps focused on factors related to customer intention and initial adoption. However, this study aims to go further by considering the relationship between intention to use and intention to return, particularly given that many mobile applications in the hospitality industry are popular and well-adopted by users (Kuo et al., 2019). Hence, we hypothesize:

Hypothesis 8. There is a positive relationship between intention to use hotel gamified mobile applications (ITU-HGMA) and intention to return to hotel gamified mobile applications (ITR-HGMA).

Insert Figure 1 here

Methods

The aim of this research is to investigate factors influencing the return to a hotel gamified mobile application. To achieve this goal, a quantitative approach was employed to validate theories, establish relationships between variables, and replicate models, methods, and techniques in other samples (Gomes et al., 2022). Data collection was conducted through a survey, with each construct measured using multiple items (Kharlamov et al., 2023; Yan et al., 2022). The survey took place from summer 2022 to summer 2023.

Sampling and participants

The study used simple random sampling strategy and employed 2 inclusion/exclusion criteria. Participants were selected based on the criteria that a) they have experience with mobile applications (ensuring familiarity with gamified mobile applications) and b) they have visited a hotel in the last two years (ensuring recent experience with hotels). The survey landing page included ethical considerations, the study's aim, a definition of the term gamification, an explanation of the term hotel gamified mobile application, and a visual representation of the technology (see Appendix 2) to provide participants with an understanding of what a hotel gamified application entails. The first part of the survey gathered information about respondents' demographic details (see Table 1) and their previous experiences with hotels and mobile applications. This stage aimed to ensure that the sampled population consisted of hotel visitors with experience in using mobile applications. The second part contained the main measurement items.

(Table 1 goes here)

Measures

The questionnaire was designed based on extant validated measurement scales in the literature (see Appendix 1) and adapted language to make the questions context-specific to hotel gamified mobile applications (Kharlamov et al., 2023). All items were measured using 5-point Likert scales, with options such as 1 = strongly disagree and 5 = strongly agree, similar to the approach used by Mäntymäki et al. (2020). To pilot-test the questionnaire, a qualitative approach was employed with 12 participants to identify whether items were clear to the sample, considering the relatively new context of hotel gamified mobile applications for the audience. Participant feedback revealed confusion with the wording of three factors due to their lack of experience with the technology. These items were subsequently reworded. Data were analysed using Confirmatory Factor Analysis as the construct tested have been robust qualities in previous studies.

Results

When the questionnaires were added to the SPSS24 system for the screening phase, 820 responses were received. However, 57 participants did not meet the filtering criteria and were subsequently excluded, leaving a sample of 763 usable questionnaires. Cronbach's alpha was used to test the reliability of the measurement items. As shown in (Table 2), the alphas of all variables were above the threshold 0.8. satisfying the reliability test. In the validity test, the

Compose Reliability (CRs) greater than 0.777, and the Average Variance Extracted (AVEs) greater than 0.5, (besides Rewards which was accepted due to the high CR value) meeting accepted values.

Insert table 2 here

Measurement model

We used confirmatory factor analysis (CFA) to test the validity of the measurement model. The factor structure for the constructs was tested among the complete sample. The pattern matrix loaded in a structure with 7 items (PE2, PE5, PEOU4, PI1, PI2, ITU4, and PU1) either cross-loading or not loading hence it was decided to be removed. When the sample was run again it provided a clear structure (Table 3).

Insert table here 3

Hypothesis testing

We examined the proposed conceptual research model using multiple regression, table 4 show the results of the study. Model summary revealed $R^2 = 52\%$. The results showed that perceived ease of use ($\beta = .236$, $p = .000$), perceived enjoyment ($\beta = .200$, $p = .000$), interactivity ($\beta = .159$, $p = .000$), social influence ($\beta = .134$, $p = .001$), perceived usefulness ($\beta = .097$, $p = .021$) and reward ($\beta = .081$, $p = .033$), all significantly affected intention to use hotel gamified mobile applications and showed a positive relationship. Therefore, the results supported the six hypothesis of H1, H2. H3, H4, H5 and H7. However, personal innovativeness had no significant effect on intention to use hotel gamified mobile applications, so the hypothesis of H6 was rejected. We then examined the relationship between intention to use hotel gamified mobile applications towards intention to return to hotel gamified mobile applications, which indicated $R^2 = 35\%$. The results showed that intention to use hotel gamified mobile applications ($\beta = .596$, $p = .000$), significantly affected intention to return to hotel gamified mobile applications and showed a positive relationship. Therefore, the results supported H8. The results and the revised theoretical model are displayed in figure 2.

Insert table 4 here

Insert figure 2 here

Discussion and implications

This study explored factors influencing intention to return to hotel gamified mobile application with intention to use hotel gamified mobile application as a mediating factor. The impact of perceived usefulness, perceived ease of use, perceived enjoyment, reward, social influence, personal innovativeness, and interactivity on intention to use hotel gamified mobile applications was examined. Additionally, the impact of intention to use hotel gamified mobile application on intention to return to hotel gamified mobile applications was investigated. Overall, the research model was supported by the results, with 7 of the 8 hypotheses being confirmed.

Six factors determine intention to use hotel gamified mobile applications (perceived ease of use, perceived enjoyment, interactivity, social influence, perceived usefulness and reward). Users perceived ease of use makes the strongest contribution amongst the six factors. This

finding echoes previous research in intention to adopt technologies in the tourism and hospitality (Li et al., 2024; Chen, Chia-Chen & Tsai, 2019), supporting the use of perceived ease of use as main determinant in TAM studies (Viviane & Susana Regina Bacelar de, 2022; Go et al., 2020). Users of hotel gamified mobile applications perceive the technology easy to use, so marketers should enhance this feeling by adding less complicated tasks and mechanics. Perceived enjoyment had the second strongest influence on users' intention to use hotel gamified mobile application, supporting previous literature of technology adoption in the field of hospitality (Yu et al., 2024; Liebana-Cabanillas et al., 2020). The strong significance of perceived enjoyment indicates that hospitality industry should utilize more game mechanics than points and badges (Al-Zaidy, 2012), to address competitiveness and achievement (Chou, 2020), since users will be looking for enjoyable activities through this technology. The application of these (well-rooted in TAM) constructs to gamified applications in the hospitality context is novel and strengthens the theoretical foundation by adapting a well-established model to a new and rapidly evolving technological landscape.

Interactivity having significant positive impact on intention to use hotel gamified mobile application adds to the extant literature of technology adoption (i.e. the work of Go et al., 2020). This finding further reinforces the suggestions regarding interactivity proposed by Etemad-Sajadi (2016). Incorporating an avatar within a hotel gamified mobile application has the potential to heighten the sense of interactivity and user engagement, aligning with the recommendations put forth by previous research. Users' perceptions of how their social environment will perceive their behaviour is important in the adoption of this technology since social influence has significant positive impact on intention to use hotel gamified mobile application supporting previous literature in the field of gamification (Hamari & Koivisto, 2015). This finding should inform marketers in the industry to apply game mechanics in this app to promote socialising opportunities amongst users. By examining a diverse set of factors influencing users' intentions to use gamified mobile applications, this study contributes to a more comprehensive understanding of the multi-faceted nature of user behaviour in the context of gamified applications. Perceived usefulness has a significant positive impact on intention to use hotel gamified mobile application, supporting previous literature in hospitality (Chen, Chia-Chen & Tsai, 2019; Li et al., 2024). Given the variety of alternative mobile applications in the market (Chun-Chi Lu et al., 2017), hotels need to demonstrate the usefulness of their gamified mobile applications over other forms of mobile applications. Reward has significant positive impact on intention to use hotel gamified mobile application. The outcomes of our study align with the findings of Adam et al. (2023), underscoring the significance of emphasizing rewards through a gamified system as opposed to a non-gamified system. This supports the notion that integrating rewards within a gamified framework plays a crucial role in influencing user behaviour and acceptance of technology in the hospitality context. This finding contributes to the broader literature on technology adoption by providing insights into the effectiveness of extrinsic motivators in gamified settings within the hospitality industry.

The absence of a significant relationship between personal innovativeness and the intention to use a hotel gamified mobile application contradicts prior findings in information technology (Twum et al., 2022) and intentions related to online shopping (Thakur & Srivastava, 2015; Madan & Yadav, 2018). With the rising popularity of mobile technologies (Yan et al., 2022) and mobile games (Kim, & Preis, 2016), users are increasingly acquainted with their functionalities and mechanics. Consequently, the importance of personal development, as well

as an individual's speed and willingness to adopt new ideas (Twum et al., 2022), may diminish in relevance to users' intentions to engage with mobile technology exhibiting game characteristics.

Theoretical Implications

The study makes several notable contributions to theoretical understanding in the field of gamified mobile applications and technology adoption. Firstly, the study extends the application of the Technology Acceptance Model (TAM) to the context of gamified mobile applications within the hospitality industry. While TAM has been widely used in technology adoption studies (Yoo et al., 2017; Yang et al., 2017), its application specifically to gamified applications in the hospitality context is novel. This contributes to the theoretical foundation by adapting a well-established model to a new and evolving technological landscape. Secondly, the study introduces and empirically supports the mediating role of intention to use in the relationship between users' perceptions and their intention to return to gamified mobile applications. This adds depth to the understanding of user behaviour, emphasizing that the intention to use serves as a mediator influencing users' intentions to return. Thirdly, by examining a diverse set of factors influencing users' intentions to use gamified mobile applications, this study contributes to a more comprehensive understanding of the multi-faceted nature of user behaviour in the context of gamified applications. This examination goes beyond traditional factors and sheds light on the importance of incorporating enjoyable and interactive elements to enhance user engagement. More importantly, it delves into the extrinsic motivation aspect by specifically examining the impact of rewards on users' intention to use gamified mobile applications. This theoretical exploration contributes to the broader literature on motivation in technology adoption, providing insights into the effectiveness of extrinsic motivators in gamified contexts within the hospitality industry. Finally, unlike many previous studies that primarily addressed factors related to customer intention and initial adoption (Alalwan, 2020), this research delves into the relationship between intention to use and intention to return in the context of hotel gamified mobile applications. This unique perspective adds depth to the understanding of user behaviour, considering the popularity and widespread adoption of mobile applications in the hospitality industry and enriches existing theories by considering the dynamics of return behaviour beyond the initial adoption stage. In summary, the study contributes to theory by extending existing models to new contexts, introducing mediating relationships, exploring diverse influencing factors, and providing a nuanced understanding of users' intentions and behaviours in the realm of gamified mobile applications within the hospitality industry. These contributions further the ongoing theoretical development in technology adoption and user behaviour studies.

Practical Implications

The study provides actionable insights for practitioners in the hospitality industry to enhance the design and effectiveness of their gamified mobile applications. Understanding the pivotal role of factors like perceived ease of use, enjoyment, interactivity, social influence, usefulness, and rewards allows practitioners to tailor their applications for heightened user engagement. By prioritizing these elements, developers can create applications that offer an enjoyable and user-friendly experience, fostering positive interactions and increasing the overall appeal of the platform. Practitioners are encouraged to strategically incorporate reward-based systems within gamified mobile applications. The study underscores the significance of extrinsic motivation,

particularly in the form of rewards, as a means to incentivize users. This insight guides practitioners in designing and promoting reward structures that align with user preferences, thereby increasing engagement and fostering positive intentions to use the application. Additionally, understanding the impact of social influence on users' intentions to use gamified applications allows practitioners to integrate features that facilitate social interactions within the platform, enhancing the overall user experience.

The study prompts practitioners to focus not only on initial adoption but also on factors influencing users' intentions to return. This shift in perspective encourages the development of long-term engagement strategies that go beyond attracting users to ensuring sustained interaction and positive return behaviour. By challenging assumptions about the role of personal innovativeness, the study provides practitioners with a nuanced understanding, prompting them to reconsider its significance in the context of mobile technologies and gamified applications. Overall, practitioners can leverage these insights to strategically position and optimize their gamified mobile applications, fostering sustained user engagement and loyalty in the competitive landscape of the hospitality industry.

Conclusion, Limitations and Future research

In conclusion, this study has delved into the intricate landscape of hotel gamified mobile applications, unravelling factors that significantly influence users' intentions to both use and return to such applications within the dynamic hospitality context. Our findings contribute valuable insights to the theoretical underpinnings of user behaviour in the realm of gamified mobile technology, shedding light on critical aspects that warrant attention from researchers and practitioners alike. The confirmation of a six-factor model comprising perceived ease of use, perceived enjoyment, interactivity, social influence, perceived usefulness, and reward attests to the multifaceted nature of user engagement in hotel gamified mobile applications. The study's approach to incorporating intention to use as a mediating factor in the relationship between various factors and intention to return adds a layer of depth to the existing literature. Recognizing the interplay between these variables contributes a nuanced understanding of the user journey within the gamified mobile application landscape. As the hospitality industry increasingly embraces mobile applications with gamified elements, this study serves as a timely and insightful guide for stakeholders seeking to maximize the impact of their offerings in an ever-evolving technological landscape.

However, this study has some inherent limitations that should be acknowledged. Firstly, the sample consisted primarily of a younger demographic, potentially introducing sample bias. Future research should aim for a more diverse participant pool, considering different age groups, to enhance the generalizability of the findings. Secondly, the survey introduced visual materials created specifically for the research. This might introduce a level of influence that could impact participants' responses. Future experimental research on different hotel gamified mobile applications might help validate the findings. It is also important to better understand the role of personal innovativeness in both initial adoption and repeat usage phases. Further research should focus on how cultural differences impact user perceptions, preferences, and behaviours concerning hotel gamified mobile applications. Cultural nuances may influence the effectiveness of gamification strategies and the factors influencing users' intentions to return. Finally, another promising avenue for research includes the exploration of the impact of personalized and tailored gamification experiences. In particular, to assess how customization

based on user preferences, behaviours, and demographics affects engagement levels and fosters a sense of connection, potentially influencing return intentions.

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Figure 1 Theoretical Framework

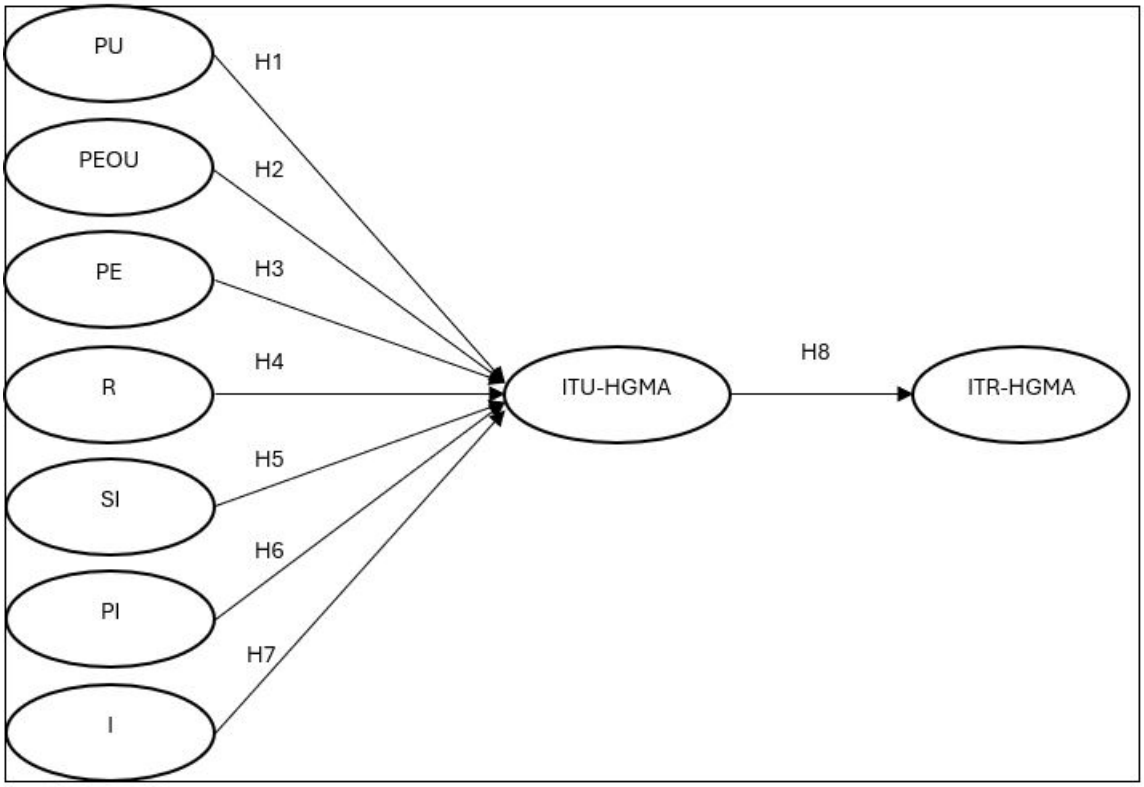

Table 1 Demographic Information

Demographic	Category	Frequencies (n)	%
Gender	Female	426	55.8
	Male	325	42.6
	Missing Values	12	1.6
Age	18-24	410	53.7
	25-34	276	36.2
	35-54	63	8.3
	55-64	7	0.9
	65+	0	0.0

	Missing Values	7	0.9
Ethnicity	United Kingdom	176	23.1
	Cyprus	176	23.1
	China	124	16.3
	Austria	115	15.1
	Greece	60	7.9
	Italy	39	5.1
	Other	70	9
	Missing value	3	0.4

Table 2 Reliability and Validity

Variables	Items	α	AVE	CR
Intention to return	5	.909	.581	.872
Intention to use	3	.872	.540	.777
Perceived usefulness	4	.900	.543	.819
Perceived ease of use	4	.890	.528	.804
Perceived enjoyment	5	.917	.642	.877
Social influence	5	.949	.655	.904
Rewards/Extrinsic motives	6	.922	.461	.836
Interactivity	3	.897	.755	.902
Perceived Innovativeness	3	.897	.632	.836

Table 3 CFA Pattern Matrix

	1	2	3	4	5	6	7	8	9
R4	.797								
R1	.721								
R2	.661								
R5	.651								
R3	.633								
R6	.591								
SI3		-.863							
SI4		-.848							
SI5		-.834							
SI2		-.782							
SI1		-.710							
ITR3			.824						
ITR4			.823						
ITR2			.782						
ITR5			.775						
ITR1			.580						
PEOU2				-.848					
PEOU3				-.804					
PEOU1				-.799					
PEOU5				-.328					
PE3					.873				
PE4					.839				
PE1					.751				
PE5					.734				
I3						.898			
I2						.866			
I1						.841			
ITU1							-.797		
ITU2							-.770		
ITU3							-.627		
PU3								.837	
PU2								.804	
PU4								.784	
PU5								.457	
PI4									-.898
PI3									-.792

PI5									-.680

Table 4 Multiple Regression

	Hypothesis	Standardized coefficients	*p*	Supported or not	Tolerance	VIF
1	PU → ITU-HGMA	.097	.021	Supported	.458	2.783
2	PEOU → ITU-HGMA	.236	.000	Supported	.428	2.339
3	PE → ITU-HGMA	.200	.000	Supported	.532	1.880
4	R → ITU-HGMA	.081	.033	Supported	.437	2.287
5	SI → ITU-HGMA	.134	.001	Supported	.428	2.339
6	PI → ITU-HGMA	.012	.746	Not supported	.458	2.783
7	I → ITU-HGMA	.159	.000	Supported	.552	1.811
8	ITU-HGMA → ITR-HGMA	.596	.000	Supported	1.000	1.000

Figure 2 Analytical results. Note. All the coefficients have p values < 0.05