Determinants of continuance intention to use gamification applications for task management: an extension of technology continuance theory

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Abstract

Purpose – Gamification applications (apps) are gaining great attention in many contexts and have grown increasingly. Despite their significant role in many settings, prior research mainly focused on initial adoption, and there are limited studies on the post-adoption stage. This study aims to explore the factors influencing individuals’ continuance intention to use gamified task manager apps, drawing on the technology continuance theory (TCT) by integrating enjoyment, habit and social influence.

Design/methodology/approach – Data were obtained from 318 Malaysian who had prior experience with task management gamified apps and analysed with the partial least squares approach.

Findings – According to the results, confirmation, perceived usefulness (PU) and enjoyment positively influence satisfaction. PU, enjoyment, satisfaction and social influence affect attitude, while the result failed to confirm the association between perceived ease of use and attitude. Furthermore, PU, attitude and habit are strong determinants of users’ continuance intention. Moreover, continuance intention was not predicted by users’ satisfaction and social influence.

Practical implications – The findings provide directions for developers and marketers of gamified task manager apps. Besides the technological and functional benefits of applications, they should also consider social, hedonic and individual factors in the designing and marketing stages.
Originality/value – This study extends the literature by assessing the determinants of continuous intention to use gamified task manager apps; and extending the TCT in the context of gamification by incorporating three contextual factors, namely, perceived enjoyment, social influence and habit.

Keywords Gamification, Continuous usage intention, Satisfaction, Continuance intention theory, Habit, Social influence

Paper type Research paper

1. Introduction

The evolution of numerous applications with highlights of game-design characteristics has introduced a new concept – gamification (Adeyemi et al., 2021). Gamification refers to “the use of game design elements in non-game contexts” (Deterding et al., 2011, p. 9). The value of the gamification market was $10.19bn in 2020 and is expected to grow to $38.42bn by 2026 (Mordor Intelligence, 2021). Gamified task manager apps use game design elements (e.g. rewards, leaderboards, achievements, levels and points) to gamify task completion (Diefenbach and Müssig, 2019; Mitchell et al., 2020). These applications enable users to create their to-do lists and gamify their daily tasks (Zhang, 2022). The focus of this study is on gamified task manager apps as their scope is broad and not restricted to a single activity or task (e.g. eating healthier, doing more sports, dieting or studying more).

Regardless of extensive belief in the advantages of gamification on users’ behaviours and motivations, some empirical research has expressed the complexity of retaining user engagement as the impacts of game factors tend to be short-lived (Li and Chu, 2021; Suh et al., 2017). It seems that gamified apps work better in the early stage of adoption due to the novelty effect associated with gamified systems (Diefenbach and Müssig, 2019; Gerdenitsch et al., 2020), and many gamified apps’ users evidently suspend their engagement after a couple of months following their initial adoption (Hamari and Koivisto, 2015a; Sanchez et al., 2020; Tyagi et al., 2022). Previous research postulated that the individuals’ continuance intention towards an information system is more critical than their initial adoption (Rahi et al., 2020). Thus, it is critical to figure out what elements may encourage users of gamified task manager apps to continue their usage (Escobar-Velásquez et al., 2022; Francis et al., 2018; Shang et al., 2022). Without an evidence-based understanding of how a gamified app encourages users and motivates them to continue using the apps, the providers and developers of the apps may not get an adequate return on their heavy investment in gamified apps (Suh et al., 2017).

The focus of the majority of prior gamification studies tied to the pre-adoption context (Aparicio et al., 2019; Feng et al., 2020; Hamari and Koivisto, 2015b), whereas few studies have explored the determinants of users’ long-term engagement with the gamified apps (Rapp et al., 2019; Wang et al., 2020). To understand the drivers of continuance intention to use gamified apps, scholars have used various technology usage theories, such as revised unified theory of acceptance and use of technology (Wang et al., 2020), expectation-confirmation model (ECM) (Jun et al., 2020) and technology acceptance model (TAM) (Huang et al., 2019). Although the above-mentioned theories explain users’ continuance intention to some extent, they also have their own limitations. For instance, TAM is largely used to identify pre-adoption behaviours, and it has significant shortcomings when it comes to explaining users’ post-adoption behaviours (Joo et al., 2018). Although ECM explains post-adoption behaviours through perceived ease of use (PEU), perceived usefulness (PU) and satisfaction, yet it does not consider a significant driver of continuance behavioural intention called attitude. To void this gap and to offer a holistic understanding of users’ continuance intention towards gamified apps, the current research used technology continuance theory (TCT) (Liao et al., 2009). TCT is a combination of TAM, ECM and
cognitive model that provides a more comprehensive insight into continuance behavioural intention than a single theory-driven model (Rahi et al., 2020).

The TCT has been used in different domains, including mobile banking (Foroughi et al., 2019), m-taxi booking (Weng et al., 2017), health care (Gilani et al., 2017) and mobile payment services (Khayer and Bao, 2019), and has demonstrated a high level of explanatory power in explaining users’ continuance intention. Liao et al. (2009) recommended to scholars to extend the TCT by incorporating context-related factors associated with the context of the study. We conducted a meta-analysis on determinants of individuals’ continuance usage intention and found perceived enjoyment, habit and social influence as three influential factors that have not been considered in the TCT. Incorporating these three factors tackles the limitation of TCT in reflecting emotional, psychological and behavioural control factors. The influence of perceived enjoyment on satisfaction and attitude has been shown in the studies of Bogicevic et al. (2017), Park (2020) and Talantis et al. (2020). Ghazali et al. (2019) and Suh et al. (2018) found that enjoyment is a critical factor in maintaining the engagement of users with gamification apps. Previous studies found social influence and habit as critical drivers of continuance intention to use (Aksoy et al., 2020; Huang, 2020; Talantis et al., 2020). Accordingly, we extended the TCT in the gamification context by incorporating perceived enjoyment, habit and social influence. The two objectives of the current research are as follows:

1. to assess the determinants of continuous intention to use gamified task manager apps; and
2. to enrich the TCT in the gamification domain by incorporating contextual factors.

This research adds value to the previous studies on gamification in various ways. Firstly, the study investigated drivers of continuous intention to use gamification apps which have received less attention in the literature. This study used the TCT to identify determinants of users’ continuance intention. The TCT’s key strength, in contrast to other technology usage theories, is that it incorporates two fundamental variables of attitude and satisfaction into a single model while keeping the well-established and first-level predictors, such as confirmation, PU and PEU (Gilani et al., 2017). By applying TCT in gamification apps, its value is confirmed in a different and new technological domain. Moreover, current research extends the TCT in the gamification context by incorporating enjoyment, habit and social influence. This study provides better insights into gamified app users’ continuance behavioural intention, which helps the providers and researchers of gamified apps develop more persuasive strategies to retain the users of gamified apps.

2. Literature review
2.1 Gamification
Gamification refers to “the process of making activities in non-game contexts more game-like by using game design elements” (Sailer et al., 2017, p. 372). Gamification aims to transfer game-design features (e.g. rewards, points, levels, badges and leaderboards) to a non-game setting. Gamification enhances the performance of the users in different contexts, such as the workplace and school, through the attractive and fun elements of real games (Pedreira et al., 2015). Gamification aims to enhance a user’s performance, motivation and engagement when performing a task (Garcia et al., 2017). Gamification generally links behaviour in real life with some type of punishment or reward in a gamified setting (Diefenbach and Müsisig, 2019). Therefore, it is expected to have beneficial motivational and behavioural effects (among others) as games.

Gamification has drawn substantial attention in many non-gaming contexts, such as health (Hammedi et al., 2017; Liu et al., 2020), fitness (Feng et al., 2020; Yin et al., 2022), education (Legaki et al., 2020; Tsay et al., 2020), environmental behaviour (Du et al., 2020; Hsu and Chen, 2021), marketing (Hollebeek et al., 2021; Hwang and Choi, 2020) and work
Gamification apps have been used in different areas with a wide range of purposes, such as individual (e.g. becoming personal task management and becoming healthier), economic (e.g. encouraging consumers to frequent purchases) or sustainable purposes (e.g. fuel-efficient driving and saving water) (Diefenbach and Müssig, 2019). In the present research, we studied the determinants of continuance intention to use the gamified task manager apps, such as Habitica, Forest Apps, SuperBetter, Epic Win, Beeminder, Challenge Timer, Fitocracy, Smarty Pig, Todoist and Bounty Tasker. This study selected the task management area due to its wide relevance and not being limited to a single task behaviour (e.g. eating healthier and doing more sports). Moreover, regarding the prediction about the diffusion of gamification, it is reported that more than 85% of daily tasks will be integrated with gaming in the near future (IEEE, 2014).

2.2 Research on gamification applications for task management in Malaysia

Recent years have witnessed a growing number of institutions and companies incorporating game mechanics and game design techniques in all types of services, applications and information systems. Following this trend, a growing number of researchers have investigated these topics. In Malaysia, scholars also discovered the potentiality and the role of gamification in enhancing and motivating users’ engagement in a desired behaviour in various contexts. For instance, using self-determination theory, Wee and Choong (2019) found that game design elements in the energy-saving campaign positively affect users’ intrinsic motivation to engage in energy conservation behaviour. In the organisational context, it was reported that effective gamification with creativity and sensitivity and implementation within the organisation could cultivate a highly competitive culture among staff, leading to high employee performance through employee engagement (Basit et al., 2021). In the context of education, Tan et al. (2023) revealed that gamification could effectively improve the learning interest of underachievers (students who have poor academic performance, are lazy in behaviour and hold negative learning attitudes in class). They stated that game elements, such as on-board tutorials, guild/teams and social pressure are necessary for a gamified learning platform to motivate underachievers online to higher participation. In another study, English language teachers’ competencies improved after using online gamified learning tools and empowered them to attempt innovation with their students (Krishnan et al., 2021). In line with the above-mentioned studies, researchers suggested that game-based learning platforms and applications can induce students’ motivations and engagement and reinforce their learning experiences (Abu Bakar et al., 2018; Anak Yunus and Hua, 2021; Mat Husin and Azmuddin, 2022; Ng et al., 2022; Tan et al., 2018; Yue and Ying, 2017). Although the existing studies in Malaysia enable us to get better insights into the benefits of gamification, most of the studies are limited to organisational and educational contexts. This study investigated the individuals’ experiences with gamified apps regardless of their purpose. Furthermore, the focus of the previous studies was on the determinants of adopting gamified apps and the impacts of apps on the users’ performance, and the drivers of users’ long-term engagement with the gamified apps have received less attention. This study addressed this gap by assessing the determinants of continuous intention to use gamified task manager apps.

2.3 Technology continuance theory

The TCT was initially proposed by Liao et al. (2009) to predict people’s intention to continue using a technology. This model integrates three well-established models, such as the cognitive model, the ECM and TAM, to assess the long-term usage behaviour of emerging technologies (Liao et al., 2009). The key advantage of TCT is that it integrates satisfaction and attitude in one technology continuance model that presents a considerable explanatory
power in assessing continuance behaviours (Weng et al., 2017). TCT proposes that five critical predictors are presented as prominent determinants in explaining the users’ intention for continuance use, including PEU, PU, confirmation, attitude and satisfaction. Several studies applied TCT in different contexts to explain continuance intentions towards different technology systems, such as mobile banking (Foroughi et al., 2019), mobile taxi booking (Weng et al., 2017), health care (Gilani et al., 2017) and mobile payment service (Khayer and Bao, 2019). These studies have determined the importance of TCT in explaining the high proportion of variance in continuance intention. The current research is grounded by the TCT because of its great explanatory power to better understand the contributing factors in the post-adoption stage (Peng et al., 2019).

Although TCT has offered a foundation for examining continuance behaviours, Liao et al. (2009) suggested that TCT can be extended by various context-related factors related to different research areas. Moreover, prior studies asserted that extension and/or combination of different theories allow researchers to get better insights from factors related to the pre-/post-adoption behaviour of a technology system (Veeramootoo et al., 2018). In response, three constructs – namely, enjoyment, habit and social influence – were added to the TCT to extend the explanatory power of the theory in explaining the continuance usage intention of task management gamified apps. Previous research indicated that these constructs play a significant role in explaining the continuance usage intention of emerging technologies (Ashrafi et al., 2022; Huang, 2019; Wang et al., 2020). Gamified task manager apps use game-design elements to gamify task completion in an attractive mode to gain higher attention from users. Users are in some way involved in leisure activities, such as gamifying their daily tasks, which make them feel pleased. In line with prior studies, Ghazali et al. (2019) and Suh et al. (2018), this study proposes that enjoyment can be one of the critical factors to determine user engagement with gamified experiences. Similarly, users’ motivation to continue using an app is influenced by the attitude of other people in their immediate environment (Chauhan et al., 2022). If others whose opinions are important to us believe that using and continuing to use a gamified task manager app is a good idea, we are more likely to continue using it.

3. Model conceptualisation and hypotheses development
On the basis of TCT (Liao et al., 2009), this study examines the constructs that have a role in contributing to users’ intention to continue task management gamified apps (see Figure 1). As specified by TCT, attitude, satisfaction and PU are the main antecedents of continuance intention. Attitude is derived by satisfaction, PU and PEU. Satisfaction is influenced by PU and confirmation. Enjoyment, habit and social influence were integrated into the original model to enhance its explanatory power.

3.1 Confirmation
Confirmation refers to the degree to which the experience in the use of information technology confirms initial user expectations (Bhattacherjee, 2001). Based on ECM, if the initial expectations of task management gamified apps are confirmed, it subsequently contributes to users’ satisfaction. Previous research on continuance usage behaviour has identified the positive influence of confirmation on satisfaction (Foroughi et al., 2019; Peng et al., 2019). Moreover, a wide range of prior studies has confirmed the positive connection between confirmation and PU (Huang et al., 2019; Khayer and Bao, 2019). Thus, the following hypotheses:

H1. Confirmation positively affects satisfaction with the use of gamification apps.
H2. Confirmation positively affects PU to use gamification apps.
3.2 Perceived ease of use

PEU refers to “the extent to which a person believes that using a technology is free of effort” (Davis, 1989). The findings of prior research have supported the positive influence of PEU on PU (Foroughi et al., 2019) and attitude (Ahn and Park, 2022; Huang and Chueh, 2022). If new technology is user-friendly and easy to learn, it would increase the user’s perception of usefulness and, furthermore, develop a positive attitude towards its use (Huang et al., 2019). Accordingly, the study hypothesised:

\[ H3. \] PEU positively affects PU in the use of gamification apps.
\[ H4. \] PEU positively affects attitude towards using gamification apps.

3.3 Perceived usefulness

PU refers to “the extent to which a person believes that using a particular technology will enhance her/his job performance” (Davis, 1989, p. 985). If new technology or an application fails to facilitate clear benefits to the users, it will cause negative attitudes, dissatisfaction and discontinuance (Kuo and Yen, 2009). Prior studies have found PU as a significant predictor of consumers’ positive attitude, satisfaction and continuance intention in information technology studies (Huang et al., 2019; Joo et al., 2017; Khayer and Bao, 2019; Leung and Chen, 2019; Yan et al., 2021). Huang et al. (2019) found that a higher perception of the usefulness of a gamification app in meeting users’ consumption expectation increases their satisfaction. Ghazali et al. (2018) found that PU positively influences consumer attitudes towards m-shopping. Accordingly, the following are hypothesised:

\[ H5. \] PU positively affects satisfaction to use gamification apps.
\[ H6. \] PU positively affects attitude to use gamification apps.
\[ H7. \] PU positively affects continuance intention to use gamification apps.
3.4 Enjoyment

Enjoyment refers to the pleasure perceived by an individual when using new technology (Rodrigues et al., 2016). Prior studies asserted that enjoyment is one of the critical factors to determine user engagement with gamified experiences (Ghazali et al., 2019; Suh et al., 2018), as it impacts expected outcomes, including satisfaction and attitude. Once individuals are satisfied with the initial fun expectation, it will increase their positive attitude towards the technology or service, and thus, they tend to use it continuously to maintain their cognitive balance (Kim, 2010). Previous studies have observed that enjoyment positively affects satisfaction and attitudes towards using technologies (Bogicevic et al., 2017; Park, 2020; Talantis et al., 2020). Hence, if the users perceive that the gamification application is fun and entertaining, interesting and creative in providing excitement experience, it will increase their satisfaction and would create a positive attitude towards using it. Therefore, the study proposed:

H8. Enjoyment positively affects satisfaction to use gamification apps.

H9. Enjoyment positively affects attitude to use gamification apps.

3.5 Satisfaction

Satisfaction refers to “the perceived discrepancy between expectation and performance after consumption” (Oliver, 1980). Rust and Oliver (1994) defined satisfaction as the degree to which people believe that experience offers positive feelings. As per the ECM, satisfaction is a significant predictor of post-adoption behaviour (Bhattacharjee, 2001; Hsu and Lin, 2015). Earlier studies have confirmed that satisfaction has a positive effect on attitudes and continuance intention (Foroughi et al., 2019; Joo et al., 2017). Khayer and Bao (2019) supported the significant role of satisfactory experience in contributing to users’ attitudes and their intention to continue using mobile payment. Accordingly, we hypothesised:

H10. Satisfaction positively affects attitude to use gamification apps.

H11. Satisfaction positively affects continuous intention to use gamification apps.

3.6 Attitude

Attitude refers to the individuals’ evaluation of an object or performance as positive or negative (Davis, 1989). As per the TAM, attitude is a key determinant of individuals’ behaviour towards the use of technology. Prior studies on various IS/IT have supported the meaningful association between individuals’ attitudes and continuance usage intention (Alihassan et al., 2020; Foroughi et al., 2019; Khayer and Bao, 2019). Accordingly, the study hypothesised:

H12. Attitude positively affects continuous intention to use gamification apps.

3.7 Social influence

Social influence refers to “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003, p. 451). Venkatesh et al. (2003) asserted that the use of new technology depends on the importance of others’ opinions (family, friends and colleagues) on individuals’ decisions. Prior studies have posited that social influence positively impacts attitudes and continuance intention of usage of a
technology or system (Aksoy et al., 2020; Huang, 2020; Razak et al., 2017). Individuals usually feel uncertainty when using new technology and, thus, tend to contact their immediate network to make decisions (Mu and Lee, 2017). The studies by Hamari and Koivisto (2013, 2015b) reported that social influence affects continuance usage intention of gamification services and attitudes. Thus, we proposed:

\[ H13. \text{ Social influence positively affects attitude towards using gamification apps.} \]
\[ H14. \text{ Social influence positively affects continuous intention to use gamification apps.} \]

3.8 Habit

Habit refers to continuous action based on individuals’ knowledge and experience (Venkatesh et al., 2003). Habit is formed in the mind of individuals and is closely tied to their future usage behaviour (Zhang et al., 2022) because people are inherently cognitive misers, preferring to reduce cognitive efforts spent in evaluation and decision-making whenever they can (Fan and Suh, 2014). Furthermore, habitual use increases the knowledge and understanding of using a particular technology, increasing the intention of continuous usage (Gefen et al., 2003). Prior studies found that habits positively influence continuous usage intention (Bölen, 2020; Nascimento et al., 2018; Talantis et al., 2020). Thus, in the domain of this study, if an individual uses the gamification app frequently, then the habit of using the application will be developed gradually. Then, it becomes a norm and routine activity and increases the continuance usage intention, and thus, we hypothesised:

\[ H15. \text{ Habit positively affects continuous intention to use gamification apps.} \]

4. Methods

4.1 Research instruments

Current research designed a survey questionnaire to gather information. The items of confirmation, PU and continuance usage intention were borrowed and modified from Bhattacherjee (2001). The items of PEU, satisfaction, attitude, enjoyment, social influence and habit were adapted from Davis (1989), Liao et al. (2009), Taylor and Todd (1995), Davis et al. (1992), Venkatesh et al. (2011) and Limayem et al. (2007), respectively. All items were measured through a five-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5). In the present research, a pre-test and pilot test were performed to ensure the validity of the survey before commencing the data collection at a large scale. The pre-test was conducted with three academicians. Some modifications were made in accordance with their comments and suggestions. Also, the questionnaire was piloted among 42 potential respondents. The pilot test results showed that Cronbach’s \( \alpha \) values were above 0.7, indicating the reliability of the questionnaire.

4.2 Participants and procedure

The users of task manager gamification apps in Malaysia form the population of this research. The data were obtained through social media platforms via an online questionnaire from 11 April to 23 June 2021. The questionnaire link was shared on social media groups with Malaysian members on different platforms, such as Facebook and Instagram, which are commonly used social media in Malaysia. We used a filtering question, and those who had not experienced using any task manager gamification apps were filtered. The respondents who answered “yes” to the question “Have you ever used
gamification applications (e.g. Habitica, Forest App, SuperBetter, Epic Win, Beeminder, Challenge Timer, Fitocracy, Smarty Pig, Todoist and Bounty Tasker) were qualified for the survey. A total of 327 surveys were obtained at the end of data collection. The data were examined for univariate outliers by computing the standardised scores for all cases. As all cases were less than three standard deviations, the findings did not show any univariate outliers (Goodboy and Kline, 2017). Even if none of the individual scores is an outlier, the case can be regarded as a multivariate outlier if this pattern is unusual in the sample. Using the Mahalanobis distance, the data were monitored for multivariate outliers. A significant test at $p < 0.001$ was also performed to identify the statistical accuracy of outlier detection. Nine multivariate outliers were detected and removed, leaving 318 usable responses for further analysis. Of all of the respondents, 56% were male, and 44% were women. A total of 122 (38.4%) participants were between 26 and 35 years old, 79 (24.8%) were between 36 and 45 years old and 58 (18.2%) were between 18 and 25 years old. Meanwhile, 48 (15.1%) respondents were between 46 and 55 years old, and 11 (3.5%) were above 55 years of age. In terms of respondents’ educational background, the majority had a Bachelor’s degree (43.1%). The majority of the respondents (85.2%) had more than one year experience of using task management gamified apps. As data were gathered from a single source, thus, the current research evaluated common method bias (CMB). We evaluated the full collinearity suggested by Kock and Lynn (2012) to assess the CMB. As indicated in Table 1, the variance inflation factor (VIF) for all variables is below 3.3, specifying that CMB was not a concern.

4.3 Data analysis
Current research used the partial least square (PLS) method to assess the hypotheses. PLS is a causal-predictive technique to structural equation modelling that maximises the amount of explained variance of endogenous variables in the model and its results are well suited to generate out-of-sample predictions. PLS was selected because of the predictive nature of this research (Hair et al., 2019), the characteristics of the study data (non-normal) and the complexity of the model (Hair et al., 2011). The study evaluated multi-variate normality, and the findings specified that the gathered data are not multi-variate normal with Mardia’s multi-variate skewness ($b = 14.679, p < 0.01$) and kurtosis ($b = 79.014, p < 0.01$), confirming the choice of PLS. Following Chin’s (2010) recommendation, the constructs’ validity and reliability were assessed by testing the measurement model and, later, the proposed hypotheses were assessed by assessing the structural model. SmartPLS 3.3.9 (Ringle et al., 2015) was used for data analysis.

5. Results
5.1 Assessment of measurement model
The measurement model was evaluated by examining convergent and discriminant validity. Three norms were considered to evaluate the convergent validity: factor loading

<table>
<thead>
<tr>
<th>Construct</th>
<th>CON</th>
<th>PU</th>
<th>PEU</th>
<th>ENJ</th>
<th>SAT</th>
<th>ATT</th>
<th>SI</th>
<th>HAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIF</td>
<td>1.389</td>
<td>2.870</td>
<td>2.696</td>
<td>1.962</td>
<td>1.901</td>
<td>2.186</td>
<td>1.849</td>
<td>2.866</td>
</tr>
</tbody>
</table>

Notes: CON = confirmation; PU = perceived usefulness; PEU = perceived ease of use; ENJ = enjoyment; SAT = satisfaction; ATT = attitude; SI = social influence; HAB = habit

Source: Author’s own creation
(above 0.7), composite reliability (CR, above 0.7) and average variance extracted (AVE, above 0.5) (Sulaiman et al., 2022). All loadings, CR and AVEs were above the recommended threshold, indicating the model has satisfactory convergent validity (Table 2).

Moreover, the discriminant validity of the constructs was examined by using the heterotrait–monotrait ratio (HTMT) (Henseler et al., 2015). As can be seen in Table 3, the HTMT values are below 0.85, demonstrating the acceptable amount of distinction between the two constructs (Iranmanesh et al., 2022; Kline, 2016).

5.2 Assessment of structural model
The model accuracy was tested using the explained variance proportion, and the $R^2$ values of PU, satisfaction, attitude and continuance intention were 0.440, 0.654, 0.633 and 0.550, respectively. Besides, Stone-Geisser’s $Q^2$ values of all endogenous constructs were above zero, signalling the model has adequate predictive relevancy. The study used non-parametric bootstrapping to evaluate the relationships in the model. According to the findings, all hypotheses were accepted except $H7, H11$ and $H14$ (Table 4).

6. Discussion
Gamification apps enhance users’ motivation and performance by providing rewarding experiences. Considering the benefits of gamified apps, the determinants of adopting the apps have attracted the attention of scholars. Although the low retention rate of gamified apps has raised concerns, the drivers of continuance intention to use gamified apps have received less attention, especially in the Malaysian context. Drawing on TCT, this study addressed this gap by investigating the determinants of intention to continue using gamified apps. The findings demonstrated that TCT has a high power to explain users’ continuance behaviour in the gamification context.

The results confirmed that confirmation positively influences satisfaction and PU, which is in line with Foroughi et al. (2019), Khayer and Bao (2019) and Rahi et al. (2020). The findings suggest that if users’ initial expectation about using gamified apps is confirmed, it enhances their PU towards the use of the system and makes them satisfied. Therefore, developers of gamified apps should have an understanding of users’ expectations and incorporate them into their designs. Marketers of gamification apps should refrain from overpromising as this may adversely affect users’ intention to continue using the app in the post-adoption stage.

Similar to the findings of prior research, the study determined that PU positively affects satisfaction (Bölen, 2020; Huang et al., 2019), attitude (Peng et al., 2019; Weng et al., 2017) and continuance intention (Ashrafi et al., 2022; Hung et al., 2020). The findings imply that, compared with confirmation, users’ PU of a gamified app is a stronger predictor of users’ satisfaction. As users’ initial expectation is derived from different sources, such as advertisement and media, the initial expectation may turn out to be unrealistic, while PU is based on users’ cognitive beliefs and can influence satisfaction more accurately. Moreover, if users of gamified apps perceive that using gamified apps facilitates the management of their task/performance, they will have a positive attitude towards the system.

The finding revealed that PEU positively influences PU, which is in line with Rahi et al. (2020) and Peng et al. (2019). Contrary to our expectation, the association between PEU and users’ attitudes was not confirmed. This result is not consistent with the findings of Ahn and Park (2022) and Huang and Chueh (2022) who found PEU as a significant driver of attitude. This finding can be justified by two potential reasons. The first reason is related to the design of gamification apps. As the design of gamification apps is similar to the common applications and users need to make less effort to learn how to use them, PEU plays an
<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Factor loadings</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation (CON)</td>
<td>My experience using this gamification app was better than what I expected</td>
<td>0.791</td>
<td>0.871</td>
<td>0.692</td>
</tr>
<tr>
<td></td>
<td>The benefit provided by this gamification app was better than what I expected</td>
<td>0.853</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall, most of my expectations from using this gamification app were confirmed</td>
<td>0.850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness (PU)</td>
<td>Using this gamification app improves my performance</td>
<td>0.837</td>
<td>0.899</td>
<td>0.691</td>
</tr>
<tr>
<td></td>
<td>Using this gamification app increases my productivity</td>
<td>0.815</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using this gamification app enhances my effectiveness</td>
<td>0.853</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I find this gamification app useful</td>
<td>0.818</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoyment (ENJ)</td>
<td>I have fun interacting with the gamified application</td>
<td>0.884</td>
<td>0.922</td>
<td>0.797</td>
</tr>
<tr>
<td>Perceived ease of use (PEU)</td>
<td>Learning to operate this gamification app is easy for me</td>
<td>0.798</td>
<td>0.880</td>
<td>0.710</td>
</tr>
<tr>
<td></td>
<td>I find it easy to get this gamification app to do what I want it to do</td>
<td>0.846</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I find this gamification app easy to use</td>
<td>0.883</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction (SAT)</td>
<td>I feel satisfied with my overall experience using this gamification app</td>
<td>0.774</td>
<td>0.905</td>
<td>0.705</td>
</tr>
<tr>
<td></td>
<td>I feel pleased with my overall experience using this gamification app</td>
<td>0.882</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel contented with my overall experience using this gamification app</td>
<td>0.853</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel delighted with my overall experience using this gamification app</td>
<td>0.845</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude (ATT)</td>
<td>All things considered, I find using this gamification app to be a wise thing to do</td>
<td>0.770</td>
<td>0.903</td>
<td>0.700</td>
</tr>
<tr>
<td></td>
<td>All things considered, I find using this gamification app to be a good idea</td>
<td>0.901</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All things considered, I find using this gamification app to be a positive thing</td>
<td>0.871</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All things considered, I find using this gamification app to be favourable</td>
<td>0.797</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social influence (SI)</td>
<td>People who are important to me would think positively of me using this gamification app</td>
<td>0.887</td>
<td>0.916</td>
<td>0.783</td>
</tr>
<tr>
<td></td>
<td>People who I appreciate would encourage me to use this gamification app</td>
<td>0.907</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>My friends would think using this gamification app is a good idea</td>
<td>0.861</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habit (HAB)</td>
<td>Using this gamification app has become automatic to me</td>
<td>0.756</td>
<td>0.869</td>
<td>0.689</td>
</tr>
<tr>
<td></td>
<td>Using this gamification app is natural to me</td>
<td>0.902</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>When faced with a need, using this gamification app is an obvious choice for me</td>
<td>0.826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuance intention (CI)</td>
<td>I intend to use this gamification app in the next 3 months</td>
<td>0.887</td>
<td>0.918</td>
<td>0.790</td>
</tr>
<tr>
<td></td>
<td>I predict I would use this gamification app in the next three months</td>
<td>0.867</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I plan to use this gamification app in the next three months</td>
<td>0.911</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** CR = composite reliability; AVE = average variance extracted  
**Source:** Author’s own creation
unimportant role in shaping the attitudes of the users. It means that as the users are familiar with the features of gamification apps, ease of use is not a concern in their decision to continue using gamification apps. The second potential reason is related to the stage of adoption. Previous studies have shown PEU losing its importance in the post-adoption stage (Gilani et al., 2017; Lin, 2011). When the user becomes familiar with the application’s environment, ease of use loses its importance. It means PEU does not affect users’ attitudes due to the familiarity and experience of users with the gamified apps.

As expected, enjoyment played a significant role in users’ satisfaction and attitude. Consistent with Mulcahy et al. (2021) and Park (2020), the findings supported the idea that, accompanied by functionality, gamified apps should provide hedonic benefits and a pleasurable experience for their users. Gamification apps provide a hedonic platform to

<table>
<thead>
<tr>
<th>Construct</th>
<th>CON</th>
<th>PU</th>
<th>PEU</th>
<th>ENJ</th>
<th>SAT</th>
<th>ATT</th>
<th>SI</th>
<th>HAB</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>0.700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.694</td>
<td>0.691</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEU</td>
<td>0.315</td>
<td>0.513</td>
<td>0.457</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENJ</td>
<td>0.686</td>
<td>0.791</td>
<td>0.708</td>
<td>0.734</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>0.579</td>
<td>0.805</td>
<td>0.592</td>
<td>0.702</td>
<td>0.824</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td>0.425</td>
<td>0.638</td>
<td>0.436</td>
<td>0.674</td>
<td>0.580</td>
<td>0.677</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.569</td>
<td>0.589</td>
<td>0.484</td>
<td>0.612</td>
<td>0.747</td>
<td>0.688</td>
<td>0.801</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAB</td>
<td>0.579</td>
<td>0.662</td>
<td>0.578</td>
<td>0.555</td>
<td>0.685</td>
<td>0.680</td>
<td>0.639</td>
<td>0.818</td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: confirmation (CON), perceived usefulness (PU), perceived ease of use (PEU), satisfaction (SAT), attitude (ATT), habit (HAB), social influence (SI), enjoyment (ENJ), continuous intention (CI)

Source: Author’s own creation

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Relationships</th>
<th>Path coefficients</th>
<th>Confidence interval bias corrected 95% confidence interval</th>
<th>t-values</th>
<th>p-values</th>
<th>Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>CON ≥ PU</td>
<td>0.372</td>
<td>(0.182, 0.458)</td>
<td>5.775</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>CON ≥ SAT</td>
<td>0.264</td>
<td>(0.149, 0.409)</td>
<td>4.850</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>PU ≥ SAT</td>
<td>0.341</td>
<td>(0.188, 0.453)</td>
<td>5.261</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>PU ≥ ATT</td>
<td>0.311</td>
<td>(0.214, 0.408)</td>
<td>3.797</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>PU ≥ CI</td>
<td>0.199</td>
<td>(0.079, 0.315)</td>
<td>2.110</td>
<td>0.017</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>PEU ≥ PU</td>
<td>0.385</td>
<td>(0.209, 0.509)</td>
<td>6.075</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H7</td>
<td>PEU ≥ ATT</td>
<td>0.028</td>
<td>(–0.041, 0.207)</td>
<td>0.425</td>
<td>0.335</td>
<td>Not supported</td>
</tr>
<tr>
<td>H8</td>
<td>ENJ ≥ SAT</td>
<td>0.420</td>
<td>(0.273, 0.519)</td>
<td>7.732</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H9</td>
<td>ENJ ≥ ATT</td>
<td>0.190</td>
<td>(0.061, 0.322)</td>
<td>2.502</td>
<td>0.006</td>
<td>Supported</td>
</tr>
<tr>
<td>H10</td>
<td>SAT ≥ ATT</td>
<td>0.286</td>
<td>(0.115, 0.404)</td>
<td>2.870</td>
<td>0.002</td>
<td>Supported</td>
</tr>
<tr>
<td>H11</td>
<td>SAT ≥ CI</td>
<td>0.095</td>
<td>(–0.044, 0.230)</td>
<td>1.159</td>
<td>0.123</td>
<td>Not supported</td>
</tr>
<tr>
<td>H12</td>
<td>ATT ≥ CI</td>
<td>0.122</td>
<td>(0.023, 0.239)</td>
<td>1.747</td>
<td>0.046</td>
<td>Supported</td>
</tr>
<tr>
<td>H13</td>
<td>SI ≥ ATT</td>
<td>0.148</td>
<td>(0.073, 0.199)</td>
<td>2.322</td>
<td>0.010</td>
<td>Supported</td>
</tr>
<tr>
<td>H14</td>
<td>SI ≥ CI</td>
<td>0.047</td>
<td>(–0.083, 0.144)</td>
<td>0.520</td>
<td>0.302</td>
<td>Not supported</td>
</tr>
<tr>
<td>H15</td>
<td>HAB ≥ CI</td>
<td>0.418</td>
<td>(0.249, 0.562)</td>
<td>4.843</td>
<td>0.000</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05; **p < 0.01

Source: Author’s own creation

Determinants of continuance intention

Table 3.  
Heterotrait–monotrait ratio (HTMT_{.85})

Table 4.  
Structural model path analysis
motivate individuals to achieve their utilitarian tasks. So, both hedonic and utilitarian factors are expected to play a role in triggering users to continue using gamification apps. The significance of PU demonstrates the importance of utilitarian aspects of the apps and the significance of perceived enjoyment indicates the importance of hedonic factors in the success of gamification apps. Furthermore, the findings revealed that the users’ satisfaction is a significant predictor of attitude, which is in line with Rahi et al. (2020) and Kumar et al. (2018).

In contrast with our prediction, the finding did not support the direct influence of satisfaction on continuance intention. This finding is not consistent with Peng et al. (2019) and Bölen (2020), who found satisfaction as an important antecedent of continuance intention. The insignificant influence of satisfaction on the intention to continue could be explained from two perspectives. Firstly, satisfaction has a high influence on attitude as a driver of continuance intention. As a result, the insignificant direct effect of satisfaction on continuance intention should not be interpreted as a lack of relationship between these two variables. Satisfaction has an indirect effect on the intention to continue through attitude. Secondly, the insignificant direct influence of satisfaction on the intention to continue using gamification apps could be explained from the habit perspective (Limayem et al., 2007). Based on the habit perspective, prior usage is expected to weaken the “evaluation-intention-usage” path. In the current research, the majority of respondents (85.2%) were experiencing any kind of task manager gamified apps for more than one year. This frequency indicates a high level of habitual use among the respondents. Due to this high level of habitual use, individuals appear to be less evaluative, leading to an insignificant role of satisfaction on continuance intention.

The result supported the impact of attitude on users’ continuance intention, which is in line with the results of Peng et al. (2019) and Weng et al. (2017). It means users will continue using gamified apps if they have positive attitudes towards using task manager gamified apps; otherwise, they will switch to alternative apps. In line with Bölen (2020) and Nascimento et al. (2018), the study found that habit significantly affects the continuance intention of individuals to use gamified apps. The finding explains that if the users of gamified apps consciously are accustomed to gamified apps, there is a great likelihood that they continue using them unconsciously (habitually). It is, therefore, necessary to take greater care of the users in the early stages of their use. As the use of gamification apps becomes a habit, users are more likely to continue to use them for a long period of time.

In line with Aksoy et al. (2020) and Atal et al. (2022), the present research revealed that social influence has a significant role in forming users’ attitudes. This finding is not surprising as Malaysia is a collectivist community, where people conform to and value the suggestions and opinions of friends and relatives. Moreover, the role of social influence as a determinant of users’ continuance intention was not verified, which is inconsistent with the result of studies conducted by Wang et al. (2020) and Bailey et al. (2020). The first plausible explanation may be that social influence has an indirect effect on continuance intention through attitude. The second potential reason is that users of gamified apps tend to make decisions to (dis)continue to use them based on their own experience in the post-adoption stage; hence, social influence had a non-significant influence on users’ continuance intention. However, in the pre-adoption stage, where they have much less experience in using technology, they prefer to choose technology based on the opinions/suggestions of their relatives, friends and peers.

7. Theoretical and practical implications
From a theoretical perspective, this study extends the literature by investigating the determinants of continuance intention to use gamified task manager apps. The study found
PU, attitude and habit as significant drivers of intention to continue using gamification apps. Attitude is driven by satisfaction, perceived enjoyment, PU and social influence. Perceived enjoyment, confirmation and PU play a significant role in shaping users' satisfaction. To the best of our knowledge, the current research is the first attempt to use TCT in explaining individuals' continuance intention to use task manager gamified apps. We enriched TCT in the gamification context by incorporating perceived enjoyment, habit and social influence. The findings confirmed the importance of these factors and imply that, besides utilitarian and technological factors, hedonic, social and individual factors play a role in shaping users' attitudes and behaviours towards gamified task manager apps. Furthermore, the findings indicated that the extended version of TCT provides a strong theoretical basis for explaining the intention to continue using gamified apps. According to the result, the extended model of TCT explains 55% of the variations of continuance intention and has high explanatory power in the gamification context. The developed integrated model provides strong theoretical insights for explaining continuance intention to use gamification apps.

The results of the current research also have multiple implications for task manager app developers and marketers. Firstly, the study confirmed the importance of TCT factors in shaping users' attitudes, satisfaction and intention to use gamified task manager apps. The significant influence of PU and confirmation indicates that developers and marketers of gamified task manager apps should give attention to the technological and functional attributes of applications and communicate about them in marketing campaigns. It means the developers of gamification apps should have a clear understanding of the needs and wants of users to design a useful application that satisfies their users' needs and accordingly gains their confirmation and PU. Marketers should highlight the utilitarian benefits of apps in their marketing campaigns to trigger users' favourable attitudes and in turn continuance intention. Although PEU has no direct effect on attitude, the designers should give attention to ease of use as it significantly influences PU. Developing a user-friendly interface may enhance the likelihood that users find the apps useful. Designing an application with features similar to popular applications, such as instant messaging apps (e.g. WhatsApp and WeChat), social media apps (e.g. Instagram and Facebook), online shopping apps (e.g. Amazon and eBay) or mobile banking apps, may enhance convenience and ease of use.

The results also verified that new factors incorporated in the TCT are critical, and managers should consider them in developing and marketing gamification apps. The significant influence of habit on the intention to continue using gamified apps implies that marketers and managers of gamified apps should promote the habitual use of gamified apps. Providing special benefits in the early stage of using apps and promoting experimentation with more or new advanced features can help to retain users and promote habitual use (Nascimento et al., 2018). Furthermore, our results stressed that enjoyment influences users' satisfaction and attitude. This finding suggests that the hedonic features of gamified apps would be appealing for individuals and motivate them to continue using gamified apps. Thus, developers of gamified apps should present attractive content to promote positive emotions and manage negative emotions. Game design helps to incorporate a mechanism for preventing too complicated tasks and a high level of frustration from unfamiliar conditions. Generally, the game mechanics and elements that could enhance the level of enjoyment and fun could involve rewards for winning or progress, feelings of achievement, overcoming challenges and a sense of exploration (Bakhanova et al., 2020). Finally, the significant impact of social influence on attitude indicates that marketers should provide different channels and encourage current users to share their experiences with others (Asadi et al., 2022).
8. Limitations and future research

The findings demonstrated that PU and attitude are significant determinants of users’ continuance intention towards task manager gamified apps, while satisfaction has no effect. Hence, future studies should investigate the determinants of PU of gamified apps to get a deeper insight into gamified app users’ behaviour and how it is possible to improve the association between PU and continuance intention to use gamified apps. The study was conducted on gamified task manager apps and its results may not be applicable to other types of gamification apps. Future studies are recommended to test the model of this study on other types of gamification apps, such as Kahoot and Fit Friendzy, which are used in the education and fitness domains, respectively. Moreover, we tested the proposed hypotheses by collecting data from Malaysia. Accordingly, future studies are required to test the relationships in other countries to determine whether the findings can be generalised to other countries.

9. Conclusion

Gamified task manager apps provide a goal-oriented framework that enables individuals to achieve their goals through the game experience and game elements, such as rewards and points (Mitchell et al., 2020). Gamification apps have received attention due to their capability to enhance productivity. Although gamified task manager apps have a high adoption rate, their low retention rate raises concerns. Drawing on the TCT, this study investigated the determinants of continuance intention to use gamified task manager apps. We found PU, attitude and habit as significant determinants of the decision to continue using gamification apps. Social influence, PU, perceived enjoyment and satisfaction significantly influence attitude. Satisfaction is triggered by PU, confirmation and perceived enjoyment. The findings of the study extend the literature by:

- shedding light on determinants of continuance intention to use gamification apps; and
- extending the TCT in the context of gamification.

The results provide directions for marketers and developers of gamified task manager apps.

References


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Further reading


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