李明青、黃正魁 (2023)，「遊戲化 APP 使用後意向調查：從正向驅動和負向驅動視角探討切換其他遊戲化 APP 的意向」，*資訊管理學報*，第三十卷，第三期，頁 255-286。

遊戲化 APP 使用後意向調查：從正向驅動和負向驅動視角探討切換其他遊戲化 APP 的意向

李明青*
國立中正大學企業管理學系

黃正魁
國立中正大學企業管理學系

摘要

在遊戲化 App 的開發與競爭中，使用者由於諸多原因轉而使用其他同質性產品。為探究影響使用者轉換行為的重要因素，本研究進行實證調查並建立一個雙驅動 SEM 模型以剖析使用者轉換遊戲化 App 意圖的原因。此研究模型是根據個人外部力量和內部力量的觀點。本研究以 142 份有效線上填答為研究樣本，採用結構方程模型(SEM)進行資料分析。研究結果顯示這些外生變數可解釋高達 46.8%的內生變數的總變異量。此研究結果希望提供 APP 設計者、企業和管理者許多建設性的建議，避免產生沉沒成本。從設計者所重視點而言，針對切換產品的因素進行品質優化和多元化服務，提高產品的內部價值，希望在有效保留現有客戶的同時，也能成為吸引使用其他 APP 客戶切換至自家產品的競爭優勢。

關鍵詞：遊戲化、切換、結構方程模型

* 本文通訊作者。電子郵件信箱：wlfa626@hotmail.com
2022/11/19 投稿；2023/01/16 修訂；2023/02/21 接受

Lee, M.C. & Huang, C.K. (2023). Investigation into the Post-adoption Intentions of Gamification Apps: From the Perspective of Positive Drivers and Negative Drivers to Explore the Intention to Switch to other Gamification Apps, *Journal of Information Management*, 30(3), 255-286

Investigation into the Post-adoption Intentions of Gamification Apps: From the Perspective of Positive Drivers and Negative Drivers to Explore the Intention to Switch to other Gamification Apps

Ming-Ching Lee*
Department of Business Administration, National Chung Cheng University

Cheng-Kui Huang
Department of Business Administration, National Chung Cheng University

Abstract

In recent years, gamification apps have attracted increasing attention, and more and more companies are engaged in their development. These apps have their own functional demands, but one thing they have in common is they are embedded with game elements.

Due to profitability potential, homogeneous gamification apps compete with one another in the market, causing users to switch to other homogenous gamification apps for various reasons and leading to the investments of providers and users becoming sunk costs. Although it is understood users may switch due to certain factors, there is limited research on the significant factors that ultimately affect users' switching behavior. To ascertain the reasons, this study conducts an empirical survey and develops a dual-driver SEM model to dissect the reasons for the user's intention to switch the gamification app. This research model is based on the viewpoint of individual exterior power and interior power. A total of 142 valid online responses were received as our research samples. The structural equation model (SEM) was applied for the data analysis. The results of data analysis show these exogenous variables can explain up to 46.8% of the variance of endogenous variable. This research result is expected to provide app designers, companies, and managers several constructive suggestions. In the view of designers' concerns, quality optimization and diversified services are

* Corresponding author. Email: wlfa626@hotmail.com

2022/11/19 received; 2023/01/16 revised; 2023/02/21 accepted

offered to increase the internal value of the product, hoping that in addition to effectively retaining existing customers, it can also become a competitive advantage to attract customers to use their switch products.

Keywords: Gamification, Switch, Structural Equation Model (SEM)

1. Introduction

Mobile device users are able to download various types of apps into their phones, tablets, or computers. The use of these apps greatly helps and brings novelty experience to users' lives. In fact, there are many apps that are used and change our usual daily life. According to the report from TechCrunch, smart phone users use at least nine apps per day and more than thirty apps per month (TechCrunch 2017). Applause quoted page 7 of "APP Annie's Spotlight on Consumer Usage repot", saying people would use an average of at least nine apps per day, with each individual app fulfilling a particular need at that moment; in addition, APP Annie reported around 30 apps were used per month with utilities and tools leading the way, and people could have up to 110 apps installed on their smartphones (APPLAUSE 2017).

Android's Google play and Apple's APP store divide apps into 25 categories which meet the needs of different users (Huang et al. 2019a). One of these categories is the gamification app which embeds game-design elements and game principles in non-game contexts, enabling the same performance to be achieved while playing games.

In recent years, gamification applications have attracted considerable attention and continued to grow due to the progress of related technologies, especially the rapid development of Augmented Reality (AR), Mixed Reality (MR) and even Virtual Reality (VR) technology making the future prospects of gamification apps bright. This is precisely because gamification can be defined as adding game-design elements to the product to increase the user's experience and enjoyment, thereby increasing the willingness to continue to use the product, and thus strengthen loyalty to the product. With the support of mobile phone apps and wearable devices and other technologies, more gamified elements, such as points, badges, leaderboards, challenges or gifting, could be applied to not only tap users' natural emotions with competition, exploration or curiosity, but to also blend business strategies with a scalable platform for better engagement and higher sales (Huang et al. 2019b).

Although gamification apps have been widely used at the current stage, fierce competition or the users' perceived value of the product may lead to corresponding discontinuance or switching behavior. Switching behavior can be defined as when users consider changing to another service provider or product after they evaluate the experience of using the service or product (Fan & Suh 2014). Discontinuance is when users would like to terminate the use of product or service and do not consider adopting its homogeneous products. At present, there is no disclosure of relevant research results on why users hold a switching intention for gamification apps. When exploring the reasons for user switching behavior, there are many apps that are quite similar but ineffective. They only offer operational guidance, and then provide some digital display

feedback. Another reason for the switching behavior may be the app's own operating interface is not user-friendly, thus making it difficult to use. If there are other homogenous products available, users are likely to have a switching intention. In addition, for products with almost the same characteristics, if one of them needs to be paid for, most users will switch to products that are free to use. The above reasons may lead users to have switching intentions, but this has not been confirmed by empirical research.

To understand the causes of the intention to switch to other gamification apps, this study proposes a dual-driver model. The positive driver consists of two constructs—attractive alternatives, social influence. The negative driver consists of three constructs—procedural switching costs, satisfaction with current gamification app, and habits. In addition, the construct of procedural switching costs has a moderating effect on the path from satisfaction with current gamification app to intention to switch to other gamification apps. These constructs are considered the main elements of the intention to switch to other gamification apps.

Although the dual-driver model is used as a basis to explain the intention to switch to other gamification apps, this study does not take into account all the factors that might lead to an intention to switch to other gamification apps. For example, sometimes the reason users' switching behaviors occur after using for a long time. They will gradually lose interest in the entertainment component attached to the game, which is governed by the law of diminishing marginal utility. This is a "feel boring" independent variable. Additionally, some users feel the interface of the app is not friendly enough and complain the apps have not been changed according to their preferences. This is a "perceived ease of use" independent variable. This study focuses on the main factors affecting the intention to switch to other gamification apps after post-adoption.

The designers, companies, and managers of gamification apps have invested a considerable amount of money in developing gamification apps. As a result, the providers may be unable to profit from their apps. Therefore, under the situation of competition between products with the same function as other providers, the reason users abandon their original app and switch to the gamification apps of other providers is the focus of this study. It is hoped after understanding the exact reason, it can be used as a reference for improving, enhancing, and upgrading their own gamification apps. In addition, some constructive suggestions can also be given to those who are interested in joining gamification app development in the future.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 proposes the research model, methodology and hypotheses. Section 4 presents the results of the data analysis. Section 5 presents the contribution,

theoretical/practical implications, research limitations, recommendations for future research, and final conclusions.

2. Literature review and research hypotheses

2.1 Gamification

Huotari & Hamari (2011), on page 5 of their published paper, define "gamification" from a service-marketing perspective as "a form of service packaging where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms to the user with an aim to facilitate and support the users' overall value creation.". The game-based product can be used as a tool to improve the participation and motivation of people in carrying out various tasks and activities that are generally not very attractive (Francisco et al. 2012).

Gamification apps usually aim to create gameful and playful user experiences, motivate desired user behaviors, and generally, increase the joy of use (Deterding et al. 2013). Seaborn & Fels (2015) proposed the definition of gamification as the use of game mechanics instead of a fully-fledged game in non-game contexts – was explored through an interactive system (hereafter "system"). Many scholars suggested their opinions on the definition of Gamification. Gamification can be defined as the use of game design elements in non-game contexts (Deterding et al. 2011).

2.2 Attractive alternatives

From the definition proposed by Merriam-Webster, alternatives are one of two or more things, courses, or propositions to be chosen. It is necessary to distinguish the differences between alternatives and substitutes to avoid misunderstanding that they are the same. As explained by WikiDiff, the difference between an alternative and a substitute is the alternative is a situation allowing a mutually exclusive choice between two or more possibilities; while the substitute is a replacement or a stand-in for something that achieves a similar result or purpose. Attractive alternatives as it were alternative attractiveness, is the positive characteristics of competing service providers — positively influences consumers' intentions to switch (Jones, Mothersbaugh, & Beatty 2000). We can also understand if the user finds other game-based apps which may be more attractive than the original app in terms of functionality, ease of use, readership, interface design, service stability, and storage capacity, then the user may trigger the intention to switch to another app for use (Zhang, Cheung, & Lee 2012).

Research by academics has also shown the greater the alternative attractiveness of other companies, the higher the likelihood of consumer switch (Chou et al. 2016). What this study intends to explore is when users trigger switching intentions and generate switching behaviors, there are many gamification apps available for them to choose from.

2.3 Social influence

Fishbein & Ajzen (1977) defined social influence as the person's perception of what those who are important to him/her think he/she should or should not do with respect to a specific behavior. In addition, the study of social influence is a strategic arena for social network research. It links the structure of social relations to the attitudes and behaviors of the actors who make up a network (Marsden & Friedkin 1993). Friedkin & Johnsen (1999) also proposed a social influence that describes the configuration and strength of interpersonal influence in a particular population. In addition, many scholars doubt use intention in that social influence affects usage intention in mandatory situations, but when users have direct experiences with the target system, this effect declines (Venkatesh & Davis 2000). With regard to the use intention that we seek to explore in this study, some scholars consider the impact of social influence on usage intention has been examined, and the typical result reported in the literature is that of a positive correlation (Hsu & Lu 2004). Social influence has gained considerable attention in the fields of psychology, marketing, and strategy management because of the important role it plays in affecting consumer behavior in the service sectors (Miura & Yamashita 2007). Rashotte (2007) thought social influence is defined as change in an individual's thoughts, feelings, attitudes, or behaviors that results from interaction with another individual or a group. With the rapid development of social networking sites (SNS), such as Facebook, Twitter, YouTube, and micro-blogs, social influence has become an important topic in academic research (Wang & Lin 2011).

2.4 Procedural switching costs

Procedural switching costs consist of economic risk, evaluation, learning, and setup costs. This type of switching cost primarily involves the expenditure of time and effort (Burnham, Frels, & Mahajan 2003). In addition to the above statement, they proposed switching costs can also be defined as the onetime costs that customers associate with the process of switching from one provider to another. They explained procedural switching cost involves the expenses of time and effort which includes learning, risk, setup, and evaluation cost. Risk cost refers to the cost of possible negative results when consumers switch to unfamiliar service providers. Evaluation cost represents the time and effort to collect and analyze information for switching decision making. Learning cost means the cost of time and effort to acquire new skills and knowledge to effectively use the services provided by new service providers. Setup cost refers to the time and effort when starting to use the services of new service providers. Ting (2014) proposed procedural switching cost involves the expenses of time and effort, and procedural switching cost includes risk cost, evaluation cost, learning cost and setup cost. Switching cost refers to all factors making it more difficult and costly for customers to switch to alternative service providers (Willys 2018).

2.5 Satisfaction

Satisfaction is an attitude formed through the mental comparison of the service and product-quality that a customer / user expects to receive from an exchange with the level of quality the consumer perceives after actually having received the service / product (Johnston et al. 1988; Oliver 1980). Satisfaction can also be said to be an emotional reaction following a disconfirmation experience which acts on the base attitude level and is consumption-specific (Oliver 1981). Both scholars Oliver & DeSarbo (1988) proposed the theory of Expectancy Disconfirmation whereby the expectancy disconfirmation is actually two processes consisting of the formation of expectations and the disconfirmation of those expectations through performance comparisons. A comparison of the expectancy and disconfirmation is negative disconfirmation if the product is worse than expected, positive disconfirmation if better than expected, and simple confirmation if it is as expected. Therefore, the comparison between expectancy disconfirmation can be seen as a concept of satisfaction. According to research by Giese & Cote (2000), customer satisfaction is not static but instead dynamic, complicated, and reflective of the environment. Many scholars believe a consumer's expectation and satisfaction are closely related (Cronin, Brady, & Hult 2000; Muylle, Moenaert, & Despontin 2004; Oliver 1980; Wang 2003).

In addition to the opinions of the above scholars on satisfaction, Abbas (2013) proposed satisfaction is needed for two reasons. First, due to its close association and effect over customer retention and incremental market share. Second, because of its ability to increase a firm's revenue and profits.

2.6 Habit

The concept of habits can be traced back to Spencer (1896), who was probably the first to point out the importance of habits in managing our daily life. Across disciplines, habits are commonly understood as learned sequences of acts that become automatic responses to specific situations which may be functional in obtaining certain goals or end states (Verplanken, Aarts, & Van 1997), and have noted when a behavior is repeatedly and satisfactorily executed, it becomes habitual (Verplanken et al. 1998).

Ouellette & Wood (1998) stated frequently performed behaviors tend to become habitual and thus automatic over time. When a behavior is repeated and becomes habitual, it is guided by automated cognitive processes, rather than by elaborate decision processes (Aarts, Verplanken, & Van 1998). As stated in "Theory and initial validation" (Limayem & Hirt 2003), habit reflects automatic behavioral tendencies developed during the past history through an individual's force of habit and information systems usage.

According to Limayem, a habit is the extent to which people tend to perform behaviors automatically because of learning (Limayem, Hirt, & Cheung 2007).

2.7 Common method bias (CMB) or Common method variance (CMV)

With the evolution of statistical technology, more and more scholars in the research field are paying attention to “common method variance”. CMV is the main source of measurement error in research issues. Measurement errors threaten the validity of the conclusions about the relationships between measures and is widely recognized to have both a random and a systematic component (Bagozzi & Yi 1991; Spector 1987); Williams, Cote, & Buckley (1989) concluded CMB was a significant problem that approximately 25% of the variation observed by researchers. Doty & Glick (1998) mentioned in the process of testing the construct validity of the research model, the main influencing factor is common method bias, or common method variance. This systematic error may lead to incorrect estimation of the correlation coefficient between variables.

2.8 Research model and hypotheses

According to several previous scholars, this study set the model as shown in Figure 1 for various factors that may affect users' switching intentions between Gamification Apps.

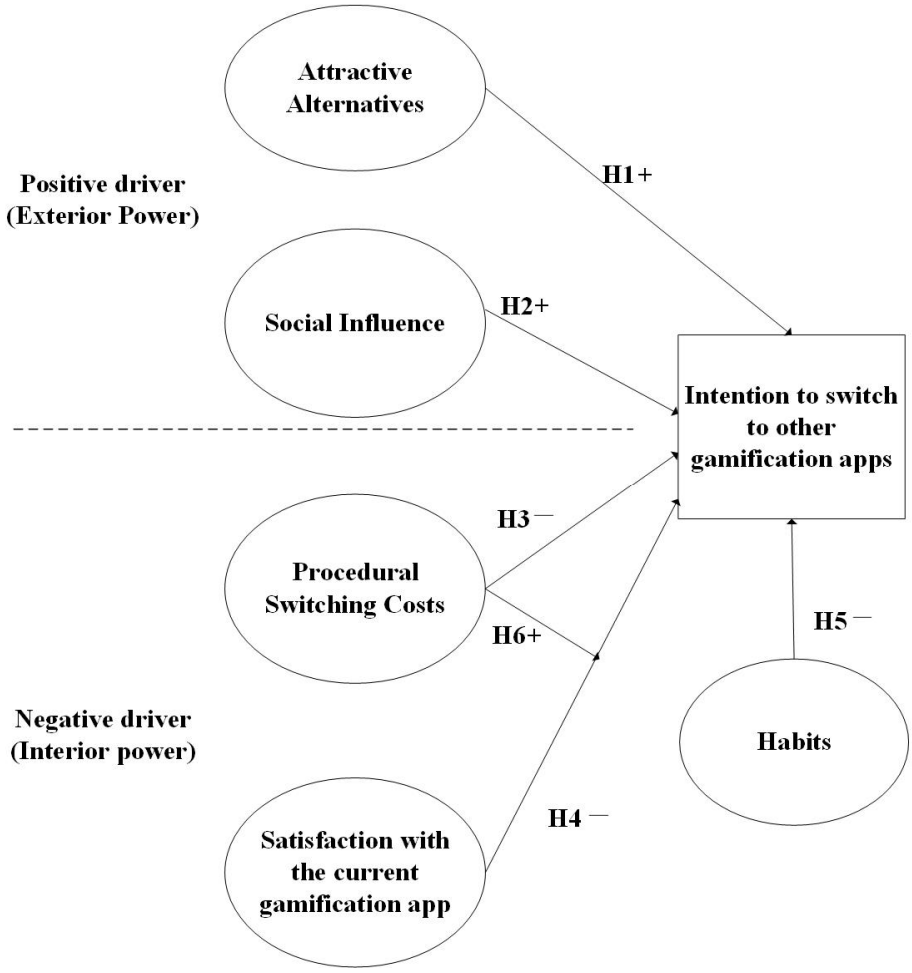

Figure 1: Research Model

In the model, five constructs affecting switching intention are classified as a positive driver (exterior power) and negative driver (interior power). The positive driver means it is not generated by the user itself, but the degree is enough to influence the user's intention to switch gamification apps. The negative driver refers to the influence on the user's intention to switch gamification apps based on the user's own perception.

To explore the intention of switching gamification apps, this study adopts the factors proposed by Zhang et al. (2012) as the factors influencing the intention to switch blog service providers. These factors include satisfaction, attractive alternatives, and sunk costs. Through the discussion of this study, it can be demonstrated the attractive alternatives positively influence the intention to switch. Mannan et al. (2017) posited perceived attractive alternatives positively affecting switching intentions in foreign mobile telecommunications market (MTM). In this study, Attractive alternatives means there are two or more homogeneous gamification apps to choose from. If users discover other gamification apps are more attractive than the original app in terms of functionality, ease of use, readership, interface design, service stability and storage capacity, then the user may decide to switch to another gamification app for use. The other providers and competitors of gamification apps in the market, as well as the highlights and competitiveness of their apps, are very important factors for whether users will make switching decisions. Hence, we hypothesize:

H1：Attractive Alternatives positively influence the intention to switch to other gamification apps.

Taking bloggers' usage intention as an example, Wang & Lin (2011) explored the influence effect of social influence on the intention to switch to other gamification apps, in which multiple mediating factors are added to the study. These mediators included information and system quality as well as blog function quality. The analysis results show social influence can explain 61.4% of the variance of intention to switch to other gamification apps through the mediator. Cokins et al. (2020) examined the impact factors of intention to use accounting platforms, and concluded social influence has a positive influence on the intention to use the accounting platforms available online. Social influence refers to the fact people change the way they think about something because they interact with other people or groups. For gamification app users, their friends, peers or group members' comments on the app will significantly impact their decision to switch to other apps. Hence, we hypothesize:

H2：Social influence positively influences the intention to switch to other gamification apps.

According to the research topic of post-adoption switching behavior of online service substitutes, Hsieh et al. (2012) proposed switching cost as one of the factors affecting switching behavior. All of the factors include weak connection, writing

anxiety, switching cost, past experience, enjoyment, relative usefulness, relative ease of use, push effects, mooring effects, and pull effects. This discussion demonstrated the mooring effects construct has strongly negative effects on intention to switch behavior. Bölen (2020) examined the relationship between innovation attributes, switching costs and consumers' switching intention, they stated procedural switching costs are negatively related to traditional wristwatch users' intentions to switch to the smartwatch.

Switching costs are the sacrifices or penalties making it difficult for customers to change providers (Jones et al. 2007). Unless other gamification apps offer excellent entry offers or conversion barriers, users usually don't want to jump to another gamification apps. Hence, we hypothesize:

H3: Procedural switching costs negatively influence the intention to switch to other gamification apps.

Sawang, Newton, & Jamieson (2013) take e-learning as the proposition and believe higher satisfaction will be accompanied by higher use intention; Corresponding to this study, that is, high satisfaction will negatively affect the use intention in switching to other gamification apps. Satisfaction can be said to be a human ability to reflect on oneself and one's situation, which invites appraisals of like and dislike (Veenhoven 1996). Mannan et al. (2017) examined customer satisfaction, switching intentions, perceived switching costs, perceived alternative attractiveness in mobile telecommunications market (MTM), they concluded customer satisfaction negatively affects switching intentions in MTM. If the user's satisfaction with the existing gamification app has positive perceived value, or if the product of other providers or competitors fails to make the user think it is better than the current app, the user will not tend to switch to other apps. Hence, we hypothesize:

H4：Satisfaction with the current gamification app negatively influences the intention to switch to other gamification apps.

When exploring the factors that influence IT switching behavior, Bhattacherjee, Limayem, & Cheung (2012) adopted habit as a factor. These factors also include relative advantage, personal innovativeness, satisfaction with prior IT, habit, IT switching intention (thereby triggering IT switching behavior). This discussion demonstrates habit is negatively related to IT switching behavior. Limayem and Hirt (2003) surveyed force of habit and information system (IS) usage that the statistics show habit is also positively associated with IS usage behavior, that is, it is negatively associated with switching intention for IS usage intention. Habit is a tendency to repeat responses given a stable supporting context (Ouellette & Wood 1998). When a user is used to repeatedly using a specific gamification app, it means their behavior has become an automated cognitive process, and after user inertia is formed, there will be less intention to try other gamification apps. Hence, we hypothesize:

H5：Habits negatively influence the intention to switch to other gamification apps.

Lai, Liu, and Lin (2011) explored the moderating effects of switching costs on the customer satisfaction-retention link, the findings of the study reveal when perceived switching costs increase, the relationship between satisfaction and customer retention diminishes, conversely strengthen the relationship between satisfaction and customer switching intention. In the research topic of whether to use the SNS service, Lee & Huang (2014) emphasized switching cost has a moderating effect on the relationship between consumer satisfaction and a continued intention to use the SNS service. Nagengast et al. (2014) believed switching cost has a degree of moderating effect on the satisfaction- repurchase behavior. In the context of our study, behavioral intentions (e.g., intention to switch to other gamification apps) lead to subsequent behaviors, so it can be summarized switching cost has a moderating effect on the association between satisfaction with the current gamification app and the intention to switch to other gamification apps. Blut et al. (2015) proposed procedural, financial and relational switching costs will affect customer satisfaction, repurchase intentions, and repurchase behavior, so we can confirm the procedural switching cost, customer satisfaction, and the intention of the behavior are related; in addition, Blut et al. (2015) also proved procedural switching cost has a significant moderating effect on the causal relationship between customer satisfaction and repurchase intentions/behavior. Customer satisfaction has a similar meaning to satisfaction with the current product, and repurchase intentions are also the perception of a certain behavior that may occur (e.g., switching intent in this study).

According to the above concept, we reasonably assume the moderating effect of procedural switching costs will increase the impact of satisfaction with the current gamification apps on the intention to switch to other gamification apps. Hence, we hypothesize:

H6：Procedural switching costs generate a positive moderating effect on satisfaction with current gamification app and intention to switch to other gamification apps.

3. Research methodology

3.1 Questionnaire development and study design

This study conducted a survey containing every construct of the proposed model. We designed and adopted validated scales from well-structured and reliable tools. The tools were designed into two-section questionnaires. The first section described the items of each construct measured on a seven-point Likert scale. Each item variable was developed by previous research and reworded to fit the gamification app context, measured on a seven-point Likert scale whereby 1 represented strongly disagree and 7 represented strongly agree. The second section was the nominal scale, which is used to

collect basic information and control variables of the respondents. The basic information of the respondents included gender, age, education level, occupation, the operating system of the mobile device, the number of gamification apps on mobile devices, the number of gamification apps on mobile devices, the app that is expected to be switched, number of years using the gamification app, usage frequency, and average number of hours spent using the gamification app recently. Some basic characteristics of these respondents can be regarded as control variables, such as gender, age, education level, etc.

The purpose of this study is to explore the intention of switching behavior, thus various products, such as Nike+ Running, Duolingo, and Pokémon Go are examined. These apps are designed to record the user's exercise or the trajectory of the game process. To send out the questionnaire, we used an online survey for the following reasons: first, the questionnaire allows an unlimited number of respondents; second, there will be no geographic restrictions on the questionnaire; finally, online surveys cost the least and elicit a quick response. For the research subjects of the questionnaire, at the beginning of the questionnaire, in addition to elaborating on the purpose of the study, it is also necessary to confirm the respondents of the questionnaire are users who have already used the gamification apps. These respondents were asked to reflect on the current status of using gamification apps, not to ask about previous experience. In addition, it should be noted these respondents meet the needs of our research purposes.

The questionnaire of this study was implemented online, and the time period was from March 11 to April 10 in 2017. This questionnaire attempted to expand the diversity of respondents' sources to make them more representative, for example, evenly distributed across different industry types. The survey questionnaire was announced publicly on PTT, Line, Meta, etc., and a reward system was provided to attract more respondents and fill in the survey seriously.

3.2 Common method bias (common method variance)

Common method bias, also known as the common method variance, may inflate the relationship between the independents and dependent variable. According to Doty & Glick (1998), common method variance occurs when the measurement technique introduces systematic variance into the measures. Richardson, Simmering, & Sturman (2009) also define common method variance as systematic error variance shared among variables measured with and introduced as a function of the same method and source.

Podsakoff & Organ (1986) recommend the use of procedural or design remedies for dealing with the common method bias problem. However, they also mentioned developments in the use of SEM may permit researchers to more effectively identify the potential impact of same-source data using statistical procedures. The study finally addressed that using SEM techniques could assess the relationships among the variables

with or without CMB. Podsakoff, MacKenzie, & Lee (2003) also argued it may have difficulty for finding a procedural remedy, so they found it useful to use one of the statistical remedies, such as Harman's single-factor test. They explained the basic assumption of this technique is if a substantial amount of common method bias is present, either (a) a single factor will emerge from the factor analysis or (b) one general factor will account for the majority of the covariance among the measures. As a result, we conducted the Harman's one-factor test to test the severity of CMB. By way of principal component analysis for all the item variables of the research model, if the test shows the first factor accounts for less than 50% of the total variance, we thus infer the common method bias is not significant. The principal component analysis reveals the first factor accounts for 27.392%, as shown in the Table 1. Therefore, we conclude the severity of CMB is not significant.

Table 1. Total Variance Explained

Initial Eigenvalues				Extraction Sums of Squared Loadings		
Com-ponent	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.478	27.392	27.392	5.478	27.392	27.392
2	4.827	24.134	51.526	4.827	24.134	51.526
3	2.875	14.376	65.902	2.875	14.376	65.902
4	1.742	8.709	74.610	1.742	8.709	74.610
5	1.321	6.604	81.214	1.321	6.604	81.214

In addition to Harman's Single Factor Test, Correlation Matrix Procedure and Full Collinearity Test can also be used to confirm the existence of CMB. Bagozzi, Yi, and Phillips (1991) proposed the second approach to detect CMB is correlation matrix procedure. Problems with CMV are evident when the correlation coefficients between latent variables are greater than 0.9. The latent variables' correlation can be observed through the discriminant validity of the Heterotrait- Monotrait Ratio (HTMT) matrix.

Kock (2015) suggested if the VIF value of the inner model is less than or equal to 3.3 when performing a full collinearity test, the model can be regarded as having no CMV. In the PLS-SEM model, all causal paths are directed to a single construct in turn, performing the algorithm function. Inner model is considered to have CMV issues if its VIF exceeds 3.3.

3.3 Analysis steps for Structural Equation Modeling

According to the suggestions of scholars Anderson, Gerbing, Williams & Hazer, two stages should be carried out to analyze SEM (Anderson & Gerbing 1988; Williams & Hazer 1986). The first stage is to examine the measurement model and the second stage is to examine the structural one. The details of these analytical methods are described as follows.

4. Data analysis and results

The number of questionnaires collected in this study was 148. After removing unqualified responses with missing or invalid data, 142 qualified responses were collected and used in this study. The following describes the detailed descriptive statistics of the questionnaire respondents. The distribution of respondents' gender was 49.3% males and 50.7% females. As for age, 50% of respondents were aged 20 to 29. In terms of education, more than 50% of these participants had a college education or above.

As for the device using the app, most users use Nike, accounting for 69%, followed by Run Keeper (7%), and Walkr (6.3%). Others choose to use other apps. As for the number of years using gamification apps, nearly 91.5% of the respondents had experience in the last three years. Note, these participants use the app no more than 6 times a week (93.7%) and no more than 6 hours a week (95.1%). These statistics can be provided to app providers to help them understand users' thoughts.

In addition to the above statistical data, this study employs the structural equation modeling (SEM) analysis method. SEM is a statistical method combining factor analysis and path analysis. It has been applied in various fields, including sociology, psychology, economics, business administration, healthcare, etc. (Huang et al. 2019a). The SEM statistical technique used in this study is PLS-SEM, which has already been demonstrated as an excellent analysis method (Xu et al. 2011). In this study, SmartPLS 3.3.0 was used for data analysis. The data analysis process was divided into three stages, namely narrative statistical analysis, reliability and validity analysis, path coefficient verification and model predictive power estimation. Different from the multiple samples and normal distribution required by the traditional structural equation model, SmartPLS can be estimated in small sample analysis, and it can also ignore the data in normal distribution (Chin, Marcolin, & Newsted 2003).

4.1 Examine the measurement model

Confirmatory factor analysis is used to test the reliability and validity of the scale. In PLS-SEM, the generally accepted indicators are Cronbach's α, composite reliability (CR), and average variance extracted (AVE). The recommended values are that Cronbach's α should be greater than 0.7 (Vale, Silcock, & Rawles 1997), CR should be greater than 0.7 (Gefen, Straub, & Boudreau 2000), and AVE should be greater than 0.5 (Fornell & Larcker 1981). Table 2 shows all the reliability indicator values and all meet the recommended standards.

Table 2: Reliability of the measurement model

Construct	Cronbach' α	CR	AVE
Attractive Alternatives	0.848	0.899	0.749
Social Influence	0.923	0.951	0.867
Procedural Switching Costs	0.941	0.941	0.842
Satisfaction with current gamification apps	0.944	0.955	0.808
Habit	0.909	0.863	0.682
Intention to switch to another gamification	0.953	0.970	0.914

Then we discuss the issue of validity in the following manner. As for content validity, Waltz, Strickland, & Lenz (1991) outlined the meaning as being when the questionnaire is submitted to experts to judge whether the research concept is integrated into the measurement tools or assist in selecting appropriate topics, so as to show the degree of experts' agreement with the content of the measurement tools in a quantitative way; the items of the survey have been confirmed to be representative and suitable by experts and scholars in their research, so the content validity is assured. Discriminant validity is established when the square root of the AVE for each construct is greater than the inter-construct correlation corresponding to the diagonal correlations of the construct to their latent variable (Sharma & Crossler 2014). Table 3 shows the discriminant meets the standards.

Table 3: Discriminant Validity

Construct	AA	SI	PS	SA	HA	IS
Attractive Alternatives (AA)	0.865					
Social Influence (SI)	0.313	0.931				
Procedural Switching Costs (PS)	-0.146	0.090	0.918			
Satisfaction with current Gamification APPs (SA)	0.014	-0.079	0.080	0.899		
Habits (HA)	0.184	0.080	-0.003	0.549	0.826	
Intention to switch to other Gamification APPs (IS)	0.325	0.634	-0.068	-0.203	-0.104	0.956

From Table 4, we can simultaneously determine whether there is a serious multicollinearity problem among the independent variables. Paul (2006) proposed that if any of the VIFs exceeds 5 or 10, it indicates the associated regression coefficients have been poorly estimated due to multicollinearity. We use SmartPLS 3.3.0 to access the values of VIF; Table 4 shows the results and confirms no one value of VIF is higher than 10, so this model can rule out the problem of multicollinearity.

Table 4: The Variance Inflation Factor

Item	VIF	Item	VIF	Item	VIF
AA1	2.004	PS1	3.546	SA4	3.432
AA2	1.950	PS2	4.928	SA5	3.024
AA3	2.337	PS3	5.283	HA1	2.824
SI1	3.478	SA1	4.799	HA2	3.882
SI2	3.723	SA2	3.438	HA3	2.928
SI3	3.276	SA3	4.993	IS1	4.500
				IS2	5.921
				IS3	6.116

4.2 Examine the structural model

After examining the measurement model, the structural model is then examined. First, we introduce path coefficient (β) and R^2 to examine the structural model. The path coefficient (β) is the degree to which one construct influences another, with a larger value indicating a stronger effect. The R^2 statistics explain the variance in the endogenous variable explained by the exogenous variables. In other words, it means how many variances in the dependent variable can be accounted for by relatively independent variables. To access the path coefficients and R^2 value, the study ran SmartPLS 3.3.0's function of algorithm and bootstrapping. Hair, Ringle, & Sarstedt (2011) proposed using bootstrapping to assess the path coefficients' significance, with at least the minimum number of bootstrap samples being 5,000 to achieve adequate stability of data results. The path coefficient (β) and statistical significance (p-value) are presented in Table 5.

Table 5: Path Relationship Checklist

Hypothesis	Path	Relationship	Path Coefficient	t-Value	p-Value	Support
H1	AA→IS	positive	0.153	2.084	0.037	✔
H2	SI→IS	positive	0.592	8.446	0.000	✔
H3	PS→IS	positive	-0.098	1.122	0.262	
H4	SA→IS	negative	-0.073	0.818	0.414	
H5	HA→IS	negative	-0.130	1.373	0.170	
H6	PSC*DIS→IS	negative	0.053	0.486	0.627	

Overall, this model can explain the variation in switch intention by 46.8%. The constructs of the positive driver (attractive alternatives and social influence) have a statistically significant influence on the intention to switch to other gamification apps with path coefficients of 0.153, 0.592 (β =0.153, $p < 0.05$; β =0.592, $p < 0.001$). Hence, hypotheses H1 and H2 are supported.

The constructs of the negative driver (procedural switching costs, satisfaction with the current gamification app, habits, and interaction term with a moderating effect on satisfaction with the current gamification app and the intention to switch to other

gamification apps) have no statistically significant influence on the intention to switch to other gamification apps with the path coefficients being -0.098, -0.073, -0.130, and 0.053; the corresponding p-value is not significant. Hence, H3, H4, H5, H6 are not supported. None of H3 to H6 reaches a statistically significant level.

This study introduces f^2 in addition to R^2 to explore the change in R^2 after deleting specific exogenous variables in the model. Removing an exogenous variable that can affect the dependent variable changes the value of R^2, and f^2 is the difference in R^2 when an exogenous variable is removed from the model. Through the explanatory value f^2, we can explore whether the specific exogenous variable has significant explanatory relevance to the endogenous variable. According to Chuan & Penyelidikan (2006), Cohen proposed the effect size index, f^2 for small, medium and large effect sizes are 0.02, 0.15, and 0.35. The value of f^2 can be obtained by executing the algorithm function in SmartPLS. From Table 6, the f^2 values are 0.037 (attractive alternatives), 0.561 (social influence), 0.017 (procedural switching costs), 0.007 (satisfaction with current gamification app), 0.021 (habits), 0.006 (the moderating effect of procedural switching costs). The effect size f^2 of social influence is large, attractive alternatives and habits are 0.037 and 0.021, respectively, which are small, and the others have no effect size.

In addition to exploring the explanatory relevance of the model, this study also introduces Q^2 to research the predictive relevance which measures whether the model has predictive power. Q^2 establishes the predictive relevance of the endogenous construct, with a value above zero indicating the model has predictive relevance (Hair et al. 2017). To find the value of Q^2, we execute the blindfolding procedure using SmartPLS.

Table 6: f^2, Q^2 and q^2 values

Construct	f^2	Q^2	q^2
Attractive Alternatives	0.037	0.378	0.026
Social Influence	0.561	0.108	0.472
Procedural Switching Costs	0.017	0.386	0.013
Satisfaction with Current Gamification App	0.007	0.375	0.031
Habits	0.021	0.398	-0.007
The Moderating Effect of Procedural Switching Costs	0.006	0.382	0.020

The reference values for the effect size of f^2 (q^2):

$0.02< f^2 (q^2) \leqq 0.15$	small effect
$0.15< f^2 (q^2) \leqq 0.35$	medium effect
$f^2 (q^2)>0.35$	large effect

Similar to the concept that f^2 can illustrate the explanatory relevance of a single construct to dependent variable, Q^2 also has the corresponding q^2 parameter for further study. q^2 is the difference in Q^2 when an exogenous variable is removed from the model. Through the explanatory value q^2, we can explore whether the specific exogenous variable has significant predictive relevance for the endogenous variable. From Table 6, the q^2 values are 0.026 (attractive alternatives), 0.472 (social influence), 0.013 (procedural switching Costs), 0.031 (satisfaction with current gamification app), -0.007 (habits), and 0.020 (the moderating effect of procedural switching costs). The effect size q^2 of social influence (0.472) is large, while attractive alternatives, satisfaction with current gamification, and the moderating effect of procedural switching costs are small (0.026, 0.031, 0.020, respectively), and the other factors have no effect size.

4.3 Result

This study proposes a dual-driver model to explore the intention to switch to other gamification apps. The positive driver (exterior power) is attractive alternatives and social influence, which refer to external incentives and the influence of others on oneself. The negative driver (interior power) is procedural switching costs, satisfaction with the current gamification, and habits, which refer to the internal value trade-off and the cognitive gap between expectation and perception. The results of this model point out the positive driver (exterior power), that is, attractive alternatives and social influence has statistically significant influences on the intention to switch to other gamification apps. This finding is consistent with previous studies.

The aspect of negative driver (interior power) can demonstrate the positive/negative impact on the intention to switch to other gamification apps. The constructs of procedural switching costs, satisfaction with the current gamification app, and habits negatively influence the intention to switch to other gamification apps; the moderating effect of procedural switching costs on the relationship between satisfaction with the current gamification app and the intention to switch to other gamification apps should also be considered as an independent variable to explore, and it shows a positive effect. The causal pathway of the finding indicates the direction of influence is consistent with previous studies; however, these hypotheses are not supported due to the path coefficients failing to reach a statistically significant level. This finding contrasts with previous research; the reasons leading to failure in meeting the criteria for statistical significance are outlined below.

As mentioned in previous studies, procedural switching costs include three categories: economic risk, evaluation, learning, and setup costs (Burnham et al. 2003). The opinions gathered from respondents in the questionnaire are mainly the time and effort required to spend to learn, or become familiar, with the new gamification apps; judging from the fact that most of our respondents are young people aged 20-30 (more

than 50%), as well as the feedback received, we believe learning and adapting to a new gamification app will not cause a great burden, making them reluctant to switch to a new product. Hence, according to the analysis of previous research data (Kramer et al. 1999; Kray et al. 2002; Mayr 2001), even if procedural switching costs do negatively affect the intention to switch to other gamification apps, it does not have a very significant impact.

H4 states satisfaction with the current gamification app negatively influences the intention to switch to other gamification apps, the results of the data analysis show the negative effects are in the correct direction, but the strength is not statistically significant. This finding is not consistent with previous studies. The reason may be abundance of choices which the modern market offers a plethora of options. Even if users are satisfied with one product, they may still consider switching due to the attractiveness of other similar products. Hence, according to the analysis of previous research data (Huang et al. 2019b), even if satisfaction with the current gamification app negatively affects the intention to discontinuance intention (the construct of this termination concept shares a comparable meaning with intention to switch to other gamification apps), it is not yet a very significant impact.

The finding H5 was unexpected. Habits do not have a statistically significant effect on the intention to switch to other gamification apps, even though their negative influence is consistent with previous studies. One possible and reasonable explanation is there are better apps that attract users' attention, allowing users to cross the inertia of habit and focus on whether to choose other apps. Understanding young people's thoughts on this view through social media such as Meta and Dcard, another possible factor explaining why users' inherent usage habits generated by the original app have no impact on the intention to switch to other gamification apps is it has become common for young people to switch between apps frequently. Hence, young people no longer think habits will affect their intention to switch to other gamification apps.

As for the moderating effect of procedural switching costs, the results of statistical tests can demonstrate it has a positive moderating effect on satisfaction with the current gamification app for the intention to switch to other gamification apps, but it did not reach a statistically significant level; hence, it can be said there is no moderating effect. The insignificant reasons may be due to users may place more emphasis on other factors, thus considering the impact of procedural switching costs is relatively less significant.

Table 7: Correlations among Latent Variables

Construct	AA	SI	PS	SA	HA	IS
Attractive Alternatives (AA)	1					
Social Influence (SI)	0.306	1				
Procedural Switching Costs (PS)	0.147	0.121	1			
Satisfaction with Current Gamification APPs (SA)	0.099	0.083	0.107	1		
Habits (HA)	0.233	0.157	0.044	0.594	1	
Intention to Switch to Other Gamification APPs (IS)	0.306	0.674	0.045	0.186	0.063	1

Then, for the common method bias problem of this study, the detection process is explained in detail. According to the following discussion by scholars Jia, Hall, & Sun (2014), there are three common ways to detect CMB. First, the Harmon's single factor test was performed. More than one single factor emerges from the unrotated factor solution, and no single factor accounts for the majority of variance; the result from Harmon's test shows the total variance for one factor is not in excess of 50% (27.392%), so it can be demonstrated without potential problem with CMB. Second, researchers compared the correlations among constructs by following the procedure established by Bagozzi, Yi, & Phillips (1991). In Table 7, the results reveal no constructs with correlations over 0.9, so it can be verified without potential problems with CMB again. Third, Kock (2015) proposed a full collinearity test, the occurrence of a variance inflation factor (VIF) greater than 3.3 is proposed as an indication of pathological collinearity, and as an indication that a model may be contaminated by common method bias. We used SmartPLS for the full collinearity test and none of the VIF values exceeded 3.3. After being demonstrated in three different ways, we can prove this research data has no potential problems of CMB, and show the test results in Table 8.

5. Conclusion and implications

To understand the factors leading to an intention to switch to other gamification apps, we set up a positive and negative driver model, developed hypotheses, conducted a survey, and examined a model. The research implications in theory and practice are discussed below.

5.1 Theoretical implications

The study provides some empirical and meaningful contributions to the dimension of switching intention. Past studies only discussed continuance/discontinuance, adoption/non-adoption of usage intention issues, tending to be demographic or sociodemographic analysis; however, the switching mechanism is rarely discussed. To fill the gap, based on the conclusions of previous scholars exploring switching behavior,

establishes a conceptual research model for researchers to explore which key factors affect the intention to switch to other gamification apps.

Table 8: Full Collinearity Test

Construct	The VIF of the remaining constructs	
Attractive Alternatives (AA)	HA	1.502
	IS	1.749
	PS	1.043
	SA	1.477
	SI	1.813
Social Influence (SI)	AA	1.190
	HA	1.449
	IS	1.177
	PS	1.028
	SA	1.468
Procedural Switching Costs (PS)	AA	1.158
	HA	1.388
	IS	1.780
	SA	1.333
	SI	1.755
Satisfaction with Current Gamification Apps (SA)	AA	1.089
	HA	1.104
	IS	1.703
	PS	1.050
	SI	1.749
Habits (HA)	AA	1.120
	IS	1.735
	PS	1.070
	SA	1.077
	SI	1.750
Intention to Switch to other Gamification Apps (IS)	AA	1.187
	HA	1.543
	PS	1.058
	SA	1.485
	SI	1.177

This study not only considers the exterior power (positive drivers), but also takes into account the influence of interior power (negative drivers) on switching intention. A positive driver generally refers to the objective environmental factors generated from the outside of the app users, which will affect the user's reference options for switching

products. A negative driver generally refers to the subjective psychological factors arising from the perceived values of app users, may dominate their basis to make judgements about switching products. The reason the constructs in the model are arranged in this way is scholars believe that for studying the switching intention of technology, only using the data of demographic or sociographic analysis fails to completely explain the behavior intention guided by personal internal or external reasons. Without a research model to investigate, we can only know the descriptive statistics of the results of the questionnaires, but cannot know how users make decisions for switching to other gamification apps. To fill the gap, this study refers to and quotes the research results of various scholars mentioned earlier to establish a multiple independent variables model to propose the antecedents of individual intention to switch to other gamification apps.

Although previous studies also revealed other independent variables such as perceived service quality, perceived usefulness, and perceived ease of use, after analyzing the relevant papers published by many scholars, we suggest these factors be summarized into one construct established in our research model. For example, the two factors of perceived usefulness and ease of use can be summarized into a single construct, satisfaction, according to the research conclusions of Calisirs' (Calisir & Calisir 2004); service quality may also affect users' intention to switch to other gamification apps, Shemwell, Yavas, & Bilgin (1998) demonstrated service quality significantly and positively affects satisfaction. As a result of the empirical analysis in this study, attractive alternatives, social influence (exterior power) positively and significantly echoed the hypothesis setting. However, procedural switching costs, satisfaction with current gamification app, habits, moderating effect resulted from procedural switching costs (interior power) was inconsistent with the hypothesis setting. Through these analyses and descriptions, this study can provide a point of view to researchers who are also interested in this topic.

5.2 Practical implication

For various reasons, users will switch to other gamification apps, which will cause increased costs and loss of profits for app companies. This study provides practical suggestions to app designers, companies and managers in case of a decreased intention to switch to other gamification apps.

The findings of this study indicate that both attractive alternatives and social influence have a statistically significant impact on the intention to switch to other gamification apps. Therefore, we should highlight the benefits of these two factors to increase users' willingness to switch to other gamification apps. For attractive alternatives, as stated by scholar Zhang et al. (2012), when users find other game-based apps which may be more attractive than the original app, they may trigger the intention

to switch to another app for use. Designers can enhance the product's competitiveness through aspects like improving app functionality, refining the user interface, optimizing the program, and providing regular updates. Moreover, enhancing the gamification experience within the app can also encourage users to switch to other gamification app products or services, incorporating elements such as challenges, point systems, and rewards. For social influence, in the above hypothesis setting, it has been verified that social influence has a positive effect on intention to switch to other gamification apps. Within the framework of gamification app design, designers can incorporate diverse social interaction behaviors instigated by individuals or influential groups which significantly impact users' intention to switch. Taking social interaction as an example, establish a gameful environment where users can cooperate or compete with each other to increase user participation; listening to user opinions and suggestions, continuously refining and optimizing gamification apps. The design of the above-mentioned game content is an attempt to increase the social influence on users, and further deepen the intention of switching gamification app products or services.

The analysis results of this study show the influences of procedural switching cost, satisfaction with the current gamification app, habits, and moderating effect resulted from procedural switching costs on the intention to switch to other gamification apps are not statistically significant. Since the majority of respondents are young individuals (20～30 years old), the impact of these factors is not readily apparent. Therefore, designers, suppliers, and managers can utilize these findings to guide their decision-making process when formulating strategies related to users' intentions to switch to other gamification apps.

5.3 Limitations and future research

Although the discussion and contribution to the mechanism of switching intention are as described above, there are still some potential research limitations in this study. First, this study finds the factors affecting the intention to switch to other gamification apps, but the conclusions of the study may not be applicable to other types of apps, such as social, navigation, video, financial management, news, and shopping apps because these types of apps have different attributes and functional performance demands. However, further research can apply this model to explore other types of apps. Second, the respondents of this questionnaire were all Taiwanese. If the questionnaire is implemented in other countries, different results might be obtained. Future research can examine different types of apps in different countries. Third, in this study, although the constructs of the negative driver were expected to affect the intention to switch to other gamification apps, they did not have a statistically significant impact. Future research can find more negative driver factors with significant effects. Fourth, the age of the respondents was mostly between 20-30 years old (60%). Future research can collect

feedback from a wider range of age groups. Fifth, most of the respondents are students, so the analysis results cannot be viewed as the real opinions of users of other occupational categories. In future research, the questionnaires can be distributed evenly among occupational categories to obtain more realistic data.

According to analysis of the questionnaire collected by respondents, 69% of respondents used Nike plus, 7% of respondents used Run Keeper, and 6.3% of respondents used Walkr, totaling more than 80%. Of these respondents, about 60% were gamified app users aged 20 to 30, with most of their use of gamified apps focused on sports and fitness products. It is thus difficult to generalize the findings to other gamified apps. This conclusion may limit the behavioral intent in that this research topic aims to cover all gamified apps. Therefore, for the future to enhance the generalization of the research topic as well as to increase the number of valid questionnaires, it is also hoped the occupation categories of the respondent can be widened, to reduce bias.

5.4 Conclusion

The purpose of this study was to examine users' intentions to switch from one gamification app to another. This study developed a research model, conducted a survey, and analyzed feedback results to draw the following conclusions. First, for the positive driver, attractive alternatives and social influence significantly influence user's intention to switch to other gamification apps. Second, for the negative driver, procedural switching costs, satisfaction with current gamification app, and habits negatively influence user's intention to switch to other gamification apps but none of these is statistically significant. Third, the moderating effect on satisfaction with the current gamification app for the intention to switch to other gamification apps is positive but not statistically significant.

The findings of this study offer both theoretical and practical implications derived from empirical research and data analysis. These research outcomes are anticipated to offer valuable insights for game app designers, providers, and managers, furnishing them with a range of beneficial insights.

6. References

Aarts, H., Verplanken, B., & Van Knippenberg, A. (1998). Predicting behavior from actions in the past: Repeated decision making or a matter of habit? *Journal of Applied Social Psychology*, 28(15), 1355-1374.

Abbas, H. A. (2013). Quality as Determinant Factor of Customer Satisfaction: Case Study of Zain-Kuwait, *iBusiness*, 5, 182-189.

Anderson, J. C. & Gerbing, D. W. J. (1988). Structural equation modeling in practice: A review and recommended two-step approach, *Psychological Bulletin*, 103(3), 411-423.

Bagozzi, R. P. & Yi, Y. (1991). Multitrait-multimethod matrices in consumer research, *Journal of Consumer Research*, 17(4), 426-439.

Bhattacherjee, A., Limayem, M., & Cheung, C. M. K. (2012). User switching of information technology: A theoretical synthesis and empirical test, *Information & Management*, 49(7-8), 327-333.

Blut, M., Frennea, C.M., Mittal, V., & Mothersbaugh, D. L. (2015). How procedural, financial and relational switching costs affect customer satisfaction, repurchase intentions, and repurchase behavior: A meta-analysis, *International Journal of Research in Marketing*, 32(2), 226-229.

Bölen, M. C. (2020). From traditional wristwatch to smartwatch: Understanding the relationship between innovation attributes, switching costs and consumers' switching intention. *Technology in Society, 63*, 101439.

Burnham, T. A., Frels, J. K., & Mahajan, V. (2003). Consumer switching costs: a typology, antecedents, and consequences, *Journal of the Academy of Marketing Science*, 31(2), 109-126.

Calisir, F. & Calisir, F. (2004). The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resource planning (ERP) systems, *Computers in Human Behavior*, 20(4), 505-515.

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study, *Information Systems Research*, 14(2), 189-217.

Chou, S. Y., Shen, G. C., Chiu, H. C., & Chou, Y. T. (2016). Multichannel service providers' strategy: Understanding customers' switching and free-riding behavior, *Journal of Business Research*, 69(6), 2226-2232.

Chuan, C. L. & Penyelidikan, J. (2006). Sample size estimation using Krejcie and Morgan and Cohen statistical power analysis: A comparison, *Journal Penyelidikan IPBL*, 7(1), 78-86.

Chuang, Y.F. (2011), "Pull-and-suck effects in Taiwan mobile phone subscribers switching intentions", *Telecommunications Policy*, 2(35), 128-140.

Cokins, G., Oncioiu, I., Türkeș, M. C., Topor, D. I., Căpuşneanu, S., Paștiu, C. A., Deliu, D., Solovăstru, A. N. (2020). Intention to use accounting platforms in Romania: A quantitative study on sustainability and social influence. *Sustainability, 12*(15), 6127.

Cronin, J., Brady, M., & Hult, G. (2000). Assessing the Effects of Quality, Value and Customer Satisfaction on Customer Behavioural Intents in Service Environment, *Journal of Ratailing*, 76(2), 193-218.

David B. (2017). Smartphone Owners Use At Least Nine Different Apps Every Day, APPLAUSE, https://www.applause.com/blog/daily-app-usage-app-annie.

Deterding, S., Björk, S. L., Nacke, L. E., Dixon, D., & Lawley, E. (2013). Designing gamification: creating gameful and playful experiences, *In CHI'13 Extended Abstracts on Human Factors in Computing Systems*, 3263-3266.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining "gamification", *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, ACM*, 9-15.

Doty, D. H. & Glick, W. H. (1998). Common methods bias: does common methods variance really bias results? *Organizational Research Methods*, 1(4), 374-406.

Fan, L. & Suh, Y. H. (2014). Why do users switch to a disruptive technology? An empirical study based on expectation-disconfirmation theory, *Information & Management*, 51(2), 240-248.

Fishbein, M. & Ajzen, I. (1977). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, Addison-Wesley, MA

Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996). The American customer satisfaction index: nature, purpose, and findings, *Journal of Marketing*, 60(4), 7-18.

Fornell, C. & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research*, 18(1), 39-50.

Francisco, A., Luis, F., González, J. L., & Isla, J. L. (2012). Analysis and application of gamification, *Proceedings of the 13th international conference on interacción persona-ordenador*, 1-2.

Friedkin, N. E. & Johnsen, E. C. (1999). Social influence networks and opinion change, *Advances in Group Processes*, 16, 1-29.

Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice, *Communications of AIS*, 4(1), 7.

Giese, J. L. & Cote, J. A. (2000). Defining consumer satisfaction, *Academy of Marketing Science Review*, 1(1), 1-22.

Hair, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2017), A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), SAGE Publications, Los Angeles.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet, *Journal of Marketing theory and Practice*, 19(2), 139-152.

Hsieh, J. K., Hsieh, Y. C., Chiu, H. C., & Feng, Y. C. (2012). Post-adoption switching behavior for online service substitutes: A perspective of the push–pull–mooring

framework, *Computers in Human Behavior*, 28(5), 1912-1920.

Hsu, C. L. & Lu, H. P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience, *Information & Management*, 41(7), 853-868.

Huang, C. K., Chen, S. H., Tang, C. P., & Huang, H. Y. (2019a). A trade-off dual-factor model to investigate discontinuous intention of health app users: From the perspective of information disclosure, Journal of Biomedical Informatics, 100, 103302.

Huang, C. K., Chen, C. D., & Liu, Y. T. (2019b). To stay or not to stay? Discontinuance intention of gamification apps, *Information Technology & People*, 32(6), 1423-1445.

Huotari, K. & Hamari, J. (2011). "Gamification" from the perspective of service marketing, Proceedings of the CHI 2011 Gamification Workshop, Vancouver, British Columbia, Canada.

Jia, L., Hall, D., & Sun, S. (2014). The effect of technology usage habits on consumers' intention to continue use mobile payments, *Proceedings of the Twentieth Americas Conference on Information Systems (AMCIS)*, Savannah, GA, USA.

Johnston, M. W., Parasuraman, A., Futrell, C. M., & Sager, J. (1988). Performance and job satisfaction effects on salesperson turnover: A replication and extension, *Journal of Business Research*, 16(1), 67-83.

Jones, M. A., Mothersbaugh, D. L., & Beatty, S. E. (2000). Switching barriers and repurchase intentions in services, *Journal of Retailing*, 76(2), 259-274.

Jones, M. A., Reynolds, K. E., Mothersbaugh, D. L., & Beatty, S. E. (2007). The positive and negative effects of switching costs on relational outcomes, *Journal of Service Research*, 9(4), 335-355.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach, *International Journal of e-Collaboration (IJEC)*, 11(4), 1-10.

Kramer, A. F., Hahn, S., & Gopher, D. (1999). Task coordination and aging: Explorations of executive control processes in the task switching paradigm. *Acta Psychologica*, 101, 339–378.

Kray, J., Li, K. Z. H., & Lindenberger, U. (2002). Age differences in task switching components: The role of task uncertainty. *Brain and Cognition*, 49, 363–381.

Lai, L.H., Liu, C.T., Lin, J.T (2011). The moderating effects of switching costs and inertia on the customer satisfaction-retention link: auto liability insurance service in Taiwan. *Insurance Markets and Companies: analyses and Actuarial Computations, 2*(1), 69-78.

Lee, C. L. & Huang, M. K. (2014). A nonlinear relationship between the consumer satisfaction and the continued intention to use SNS services: The moderating role

of switching cost, *International Journal of Electronic Business Management*, 12(2), 90-101.

Limayem, M. & Hirt, S. G. (2003). Force of habit and information systems usage: Theory and initial validation, *Journal of the Association for Information Systems*, 4(1), 65-97.

Limayem, M., Hirt, S. G., & Cheung, C. M. (2007). How habit limits the predictive power of intention: The case of information systems continuance, *MIS Quarterly*, 31(4), 705-737.

Mannan, M., Mohiuddin, M. F., Chowdhury, N., & Sarker, P. (2017). Customer satisfaction, switching intentions, perceived switching costs, and perceived alternative attractiveness in Bangladesh mobile telecommunications market, *South Asian Journal of Business Studies*, *6*(2), 142-160.

Marsden, P. V. & Friedkin, N. E. (1993). Network studies of social influence, *Sociological Methods & Research*, 22(1), 127-151.

Mayr, U. (2001). Age differences in the selection of mental sets: The role of inhibition, stimulus ambiguity, and response-set overlap. *Psychology and Aging*, 16, 96–109.

Miura, A. & Yamashita, K. (2007). Psychological and Social Influences on Blog Writing: An Online Survey of Blog Authors in Japan, *Journal of Computer-Mediated Communication*, 12(4), 1452-1471.

Muylle, S., Moenaert, R., & Despontin, M. (2004). The conceptualization and empirical validation of web site user satisfaction, *Information & Management*, 41(5), 543-560.

Nagengast, L., Evanschitzky, H., Blut, M., & Rudolph, T (2014) New Insights in the Moderating Effect of Switching Costs on the Satisfaction–Repurchase Behavior Link, *Journal of Retailing*, 90(3), 408-427.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions, *Journal of Marketing Research*, 17(4), 460-469.

Oliver, R. L. (1981). Measurement and evaluation of satisfaction processes in retail settings, *Journal of Retailing*, 57(3), 25-48.

Oliver, R. L. & DeSarbo, W. S. (1988). Response determinants in satisfaction judgments, *Journal of Consumer Research*, 14(4), 495-507.

Ouellette, J. A. & Wood, W. J. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior, *Psychological Bulletin*, 124(1), 54-74.

Paul, R. K. (2006). Multicollinearity: Causes, effects and remedies, *Agricultural Statistics, Roll No. 4405, IASRI, New Delhi*, 1(1), 58-65.

Pavlou, P. A., Liang, H., & Xue, Y. (2007). Understanding and mitigating uncertainty in online exchange relationships: A principal-agent perspective, *MIS Quarterly*,

31(1), 105-136.

Podsakoff, P. & Organ, D. (1986). Self-reports in organizational research: Problems and prospects, *Journal of Management*, 12(4), 531-544.

Podsakoff, P. M., MacKenzie, S. B., & Lee, J. Y (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies, *Journal of Applied Psychology*, 88(5), 879-903.

Rashotte, L. (2007). Social influence. In G. Ritzer (Ed.), *The Blackwell encyclopedia of Sociology*, 6(1), 4426-4429.

Richardson, H. A., Simmering, M. J., & Sturman, M. C. (2009). A tale of three perspectives: Examining post hoc statistical techniques for detection and correction of common method variance, *Organizational Research Methods*, 12(4), 762-800.

Sarah P. (2017). Report: Smartphone owners are using 9 apps per day, 30 per month, TechCrunch, https://techcrunch.com/2017/05/04/report-smartphone-owners-are-using-9-apps-per-day-30-per-month/

Sawang, S., Newton, C., & Jamieson, K. (2013). Increasing learners' satisfaction/intention to adopt more e-learning, *Education and Training*, 55(1), 83-105.

Seaborn, K. & Fels, D. I. (2015). Gamification in theory and action: A survey, *International Journal of Human-Computer Studies*, 74, 14-31.

Sharma, S. & Crossler, R. E. (2014). Disclosing too much? Situational factors affecting information disclosure in social commerce environment, *Electronic Commerce Research and Applications*, 13(5), 305-319.

Shemwell, D. J., Yavas, U., & Bilgin, Z. (1998). Customer-service provider relationships: an empirical test of a model of service quality, satisfaction and relationship-oriented outcomes, *International Journal of Service Industry Management*, 9(2), 155-168.

Spector, P. E. (1987). Method variance as an artifact in self-reported affect and perceptions at work: Myth or significant problem? *Journal of Applied psychology*, 72(3), 438.

Spencer, H. (1896). *The Principles of Psychology*, Longman, Brown, Green & Longman, London.

Ting, S. C. (2014). The relationship between customers' switching cost and repurchase intention: The moderating role of satisfaction, *Journal of Service Science and Management*, 7(4), 313-322.

Vale, L., Silcock, J., & Rawles, J. (1997). An economic evaluation of thrombolysis in a remote rural community, *BMJ*, 314, 570-572.

Veenhoven, R. (1996). Developments in satisfaction-research, *Social Indicators*

Research, 37(1), 1-46.

Venkatesh, V. & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies, *Management Science*, 46(2), 186-204.

Verplanken, B., Aarts, H., & Van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices, *European Journal of Social Psychology*, 27(5), 539-560.

Verplanken, B., Aarts, H., Van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behaviour: a field experiment, *British Journal of Social Psychology,* 37(1), 111-128.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (1991). *Measurement in nursing research*. 2nd Ed., philadelphia: F.A. Davis.

Wang, S. M. & Lin, J. C. C. (2011). The effect of social influence on bloggers' usage intention, *Online Information Review*, 35(1), 50-65.

Wang, Y. S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems, *Information & Management*, 41(1), 75-86.

Williams, L. J., Cote, J. A., & Buckley, M. R. (1989). Lack of method variance in self-reported affect and perceptions at work: reality or artifact? *Journal of applied psychology*, 74(3), 462.

Williams, L. J. & Hazer, J. T. (1986). Antecedents and consequences of satisfaction and commitment in turnover models: A reanalysis using latent variable structural equation methods, *Journal of Applied Psychology*, 71(2), 219-231.

Willys, N. (2018). Customer Satisfaction, Switching Costs and Customer Loyalty: An Empirical Study on the Mobile Telecommunication Service, *American Journal of Industrial and Business Management*, 8, 1022-1037.

Xu, H., Dinev, T., Smith, J., & Hart, P. (2011). Information privacy concerns: Linking individual perceptions with institutional privacy assurances, *Journal of the Association for Information Systems*, 12(12), 798-824.

Zakiy, M. and Haryanto, M. (2021), “Linking of Service quality and Switching costs with Turnover intentions: the mediating role of customer loyalty”, *Proceedings of the 4th International Conference on Sustainable Innovation 2020-Accounting and Management (ICoSIAMS 2020)*, Atlantis Press, Paris, France, pp. 29-37

Zhang, K. Z., Cheung, C. M., & Lee, M. K. (2012). Online service switching behavior: the case of blog service providers, *Journal of Electronic Commerce Research*, 13(3), 184-197.

Appendix. Item variables for each study construct

Construct	Item variable
Attractive Alternatives	1. If I needed to replace it, there were other great Gamification Apps for me to choose from
	2. I am satisfied with the way in which other Gamification Apps operate and function
	3. There are other Gamification Apps that make me equally or more satisfied than my current app
Social Influence	1. My important family and friends will want me to change the Gamification App I use now
	2. People who can influence my behavior will think I should replace the Gamification App I am currently using
	3. People whose opinions I value will suggest I change the Gamification App I currently use
Procedural switching costs	1. I felt if I changed to the new Gamification App, I would need to spend a lot of effort to familiarize myself with the new operations and features
	2. I felt like I had to put a lot of effort into learning the operations and features that the Gamification App provides
	3. I felt if I changed to the new Gamification App, I would need to spend a lot of time getting used to the new operations and features
Satisfaction with current Gamification App	1. I'm happy with the overall experience of the existing Gamification App
	2. I am pleased with the overall experience of the existing Gamification App
	3. I'm satisfied with the overall experience of the existing Gamification App
	4. I'm happy with the overall experience of the existing Gamification App
	5. I'm happy with the need for the existing Gamification App
Habits	1. The use of the existing Gamification App has become an automatic and spontaneous thing for me
	2. Use of the existing Gamification App came naturally to me
	3. When I need exercise, using the current Gamification App couldn't have been the obvious choice for me
intention to switch to other Gamification Apps	1. In the next two weeks, I may switch to another Gamification App
	2. In the next two weeks, I plan to abandon my current Gamification App
	3. In the next two weeks, I want to convert my existing app into another Gamification App