

TOWARD SUSTAINABLE FREEMIUM SOFTWARE: THE ROLES OF USER SATISFACTION AND USE CONTEXT

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ABSTRACT

Freemium software provides basic features free of charge and premium features for additional payment. It is a prevailing business model in the software industry. The model could be a long-awaited solution for software providers suffering from sustainability and retention problems. However, software providers are still experiencing low conversion rates from free users to paid users. Satisfactory services do not guarantee additional spending by free users for services. User satisfaction with core services has been considered a key component of user loyalty. However, this belief is being challenged. This study investigates the effect of satisfaction on loyalty intentions (continuance intention and intention to purchase) of freemium software. The study develops a research model based upon the use context framework including user characteristics, relational characteristics, and marketplace characteristics. The results from a series of regressions show that satisfaction affects continuance intention but does not influence purchase intention although it indirectly affects purchase intention by interacting with various characteristics. The results suggest several strategies that freemium software providers can pursue according to their objectives. Rather than satisfactory services, interactions among users or carefully designed additional features can lead to sustainable profitability.

Keywords: Freemium software; User satisfaction; User loyalty; Use context;

1. Introduction

In past decades, information technology (IT) business models have been developed in parallel with the advancement of IT. With the emergence of the World Wide Web, companies who had sold software applications changed their strategy and began to provide free applications to attract users and gain revenue from advertisers. This business model was prevalent among software providers in the early 2000s. However, low advertising revenues and difficulties in retaining users and maintaining services rendered the business model difficult to sustain [Lin et al. 2013]. Software providers began to consider the possibility of charging users.

A new business model, “freemium” emerged as an alternative [Anderson 2009]. Freemium, a combination of “free” and “premium,” is a business model that provides free basic features and charges for premium features. Users can access basic services without paying and can then upgrade to premium services. Software provides value that users cannot recognize until it is experienced [Shapiro and R.Varian 1999]. Therefore, offering free versions is appropriate to provide users the opportunity to experience and value software applications. Basic versions of software

applications attract users who then recognize the need to use premium features [Halbheer et al. 2014]. Although freemium models focus on converting free users to paid users, providers can sustain services with less than 5 to 10% of paid users [Lyons et al. 2012]. Additionally, free users have their own role to play in the freemium model. Additional sources of advertising revenue in some freemium software applications exist, and an increased number of users cause network externality expanding the opportunities for user interactions. Companies provide referral bonuses to users to attract others who may possibly convert to paid users.

The freemium model has been adopted by most software providers and has prevailed as a leading business model. Most mobile applications using the freemium model provide various services including cloud storage, music streaming, and free-to-play games. The freemium model seems to be a long-awaited solution for software providers suffering from a sustainability problem [Wagner et al. 2014]. However, despite its popularity and suitability in the software industry, the freemium model is still challenged. For many start-ups, the model fails because of low conversion rates to paying users [Kumar 2014; Teece 2010]. This could be because some users do not want to pay for software applications. Users are accustomed to free software [Lyons et al. 2012], and some consider that all online software should be free [Lin et al. 2013]. Some companies fail to optimize their free offerings and are forced to adjust their strategy. Evernote, a note-taking software application, limited the maximum number of devices used by a user to two for the basic plan when there had been no limitation previously. The New York Times decreased the number of free articles provided on the web from 20 per month to 10 per month.

To solve the freemium model sustainability problem, researchers have investigated optimal strategies for companies and the potential factors affecting user intention to pay for premium services. Previous studies include optimal levels of free offerings [Halbheer et al. 2014; Niculescu and Wu 2014; Thomes 2013], the effect of user-to-user interaction or community participation [Li et al. 2014; Oestreicher-singer and Zalmanson 2013], the effect of software service quality [Hamari et al. 2017; Hsiao and Chen 2016], the effect of differences or similarities between free and premium versions [Koch and Benlian 2016; Wagner et al. 2014], and the effect of users' mentality with respect to the freemium model [Lin et al. 2013]. However, these studies focused on a few factors instead of carefully considering the context in which users use software applications. According to the usage environment, personal characteristics, and task characteristics, a user's usage experience and its value are completely different [Chellappa and Shivendu 2005]. Additionally, in the use context of freemium, users can take various actions such as continue use, purchase additional features, and recommend the product to acquaintances instead of simply adopting the service or product. Thus, understanding the diversity of usage contexts is required to study freemium user behaviors.

This study examines how users' loyalty intentions toward freemium software are affected by three use-context factors: user characteristics, relational characteristics, and marketplace characteristics. In addition, although several studies investigated the freemium model, most of them were not empirically investigated. By empirically examining various factors, this study expands the understanding of user behavior in the freemium model. Freemium software providers can refer to this study while establishing their strategies.

This study is based on the framework suggested by Seiders et al. [2005]. The framework from Seiders et al. [2005] investigates users' post-purchase relationship between core-service satisfaction and loyalty intentions considering different factors. The framework categorized previously studied factors into three categories: user characteristics, relational characteristics, and marketplace characteristics. These factors have either direct effects on user loyalty intentions or moderating effects on the satisfaction-loyalty relationship. This study uses the research framework from Seiders et al. [2005] and applies it to the context of freemium software. Based on the usage experience of users, we examine how user characteristics, relational characteristics, and marketplace characteristics influence the relationship between satisfaction and loyalty intentions.

The remainder of the paper is organized as follows. The next section reviews the extant literature related to user loyalty and use contexts in which users use software applications. Section 3 develops a research model and hypotheses considering the characteristics of the freemium model. Section 4 introduces research methods to test established hypotheses, and section 5 presents the results of the study through a series of data analyses. Section 6 discusses the major findings of this research, and the implications and limitations of the study are presented with suggested directions for further studies.

2. Theoretical Background

For freemium products or services, user behaviors are determined based on the usage experiences of free versions of freemium products or services. Thus, the focus of freemium study should be on the post-adoption behaviors of users not their initial adoption since the adoption of the software has already occurred. This study begins with a review of the previous literature related to user loyalty.

2.1. User Satisfaction and Loyalty

As industry competition intensifies, companies face difficulty attracting new users [Berry 1995]. Companies realized that retaining users costs less than acquiring new users, and began to shift their focus to existing users [Jones et al. 2000]. The cost of servicing existing users is less, and existing users may pay premium prices as the relationship between the company and the user extends [Ganesh et al. 2000]. Therefore, loyal users are sources of a continuous profit stream as they pay premium prices reducing operation and marketing costs [Yi and La 2004]. According to Reichheld and Sasser Jr [1990], companies can almost double their profit by retaining just an additional 5% of their users. With the increasing importance of user retention, companies allocate resources to marketing strategy development to retain existing users.

Literature on user retention has emerged since Berry [1983] first stated the concept of relationship marketing and emphasized the importance of keeping users. In recent decades, core service satisfaction has been considered a key component of user retention [Jones et al. 2000; Oliver 1999]. Satisfaction is defined as an overall evaluation of a product or service formed from consumption experience over time [Anderson et al. 1994; Fornell 1992]. Researchers have investigated the relationship between satisfaction and user retention and empirically found satisfaction to be linked to user loyalty [Voss et al. 2010]. Researchers argue that satisfied users buy more frequent and larger volumes of goods and services, which improves the profitability of providers. Companies set their marketing strategies to maximize user satisfaction believing that the efforts would lead to profitability [Anderson and Sullivan 1993].

The traditional beliefs, however, have been challenged by the evidence in recent studies. Satisfaction may not have any effect on user loyalty and does not always result in repurchase in certain circumstances [Mittal and Kamakura 2001; Nagengast et al. 2014; Seiders et al. 2005; Voss et al. 2010; Yi and La 2004]. In Burnham et al. [2003]'s study, satisfaction could explain 16% of the variation in users' intention to stay with incumbent providers while 30% could be explained by the inclusion of switching costs. Some studies found no relationship between satisfaction and user loyalty [Agustin and Singh 2005]. Although user satisfaction is important for retaining users, previous studies fail to fully explain user loyalty intentions [Kumar et al. 2013]. Either elapsed time after purchase decreases the effect of satisfaction [Mazursky and Geva 1989], or the effect of satisfaction is not observed because it can vary with user characteristics [Mittal and Kamakura 2001]. Users with the same satisfaction level do not have the same repurchase level, and a positive attitude does not always lead to loyalty.

Several studies have been conducted to supplement the evidence on the effect of satisfaction on user loyalty intention. These studies have considered factors that have both direct relationships with loyalty intentions other than satisfaction and factors that interact with satisfaction to moderate the relationship between satisfaction and loyalty intentions. Various factors including user characteristics such as age, education level, and marital status [Mittal and Kamakura 2001], relationship age between a user and a company [Bolton 1998; Verhoef 2003], and switching cost [Jones et al. 2000] have been introduced. Based on these works, Seiders et al. [2005] suggested a conceptual framework that categorizes the factors affecting loyalty intentions. They reviewed previous studies on the satisfaction-loyalty relationship and broadly categorized the factors. The framework includes three categories of user characteristics, relational characteristics, and marketplace characteristics. These characteristics have direct relationships with loyalty intentions and possibly moderate the satisfaction-loyalty relationship.

2.2. User Characteristics

User characteristics explain how variations among users influence user loyalty. According to Mittal and Kamakura [2001], (1) due to different thresholds or tolerance levels, user loyalty might be different even if the satisfaction rating from the survey is the same, and (2) the response bias or non-linear link between satisfaction and loyalty are caused by differences in characteristics among users. In addition to demographic characteristics such as sex, education, marital status, age, and the number of children [Cooil et al. 2007; Mittal and Kamakura 2001], prior literature investigated the effects of user size [Bowman and Narayandas 2001, 2004], knowledge level [Capraro et al. 2003], variety-seeking behavior [Sánchez-García et al. 2012], and involvement in product category [Seiders et al. 2005; Voss et al. 2010] on loyalty intentions.

We examine personal innovativeness and free mentality in this study. Personal innovativeness has been considered an important factor affecting the adoption of and spending on information systems (IS) [Agarwal and Prasad 1998]. Users with high innovativeness can take more risks and tend to form more positive attitudes toward new technologies. Freemium is a relatively new way of using software that can attract innovative users. Therefore, innovative users are expected to have high willingness to use and pay for freemium software. Free mentality reflects the characteristics of users who became accustomed to using applications free of charge [Dou 2004]. Software providers have provided their products and services free for decades relying on advertising fees. Users gradually have been accustomed to using software for free and have developed free mentality. Users with high free mentality seek free software and have no intention to pay. Freemium software providers are having trouble solving the free mentality

issue [Lin et al. 2013]. Thus, personal innovativeness and free mentality of users are examined in the freemium context.

2.3. Relational Characteristics

Relational characteristics indicate the relationship between users and companies. While using a product or service, users have various interactions with companies that influence their loyalty intentions. Previous research examined relationship duration [Cooil et al. 2007; Mittal et al. 1999; Verhoef 2003; Verhoef et al. 2002], interpersonal relationships [Agustin and Singh 2005; Jones et al. 2000], relationship program participation [Seiders et al. 2005; Voss et al. 2010], and critical incidents [van Doorn and Verhoef 2008]. As the relationship with a company extends, users are convinced of their usage experience, which positively affects loyalty intentions. For service industries, for example, users maintain current relationships with the incumbent service providers to preserve personal bonds with agents.

We examine the effects of relationship duration and user-to-user relationships among users of freemium applications on loyalty intentions. As the usage period lengthens, users become confident with their usage experience and may be motivated to purchase additional features because of the limited features of free versions. For instance, a shortage of storage capacity can occur while using a cloud storage service, and users might need more commodities or items while playing a game. Therefore, this study predicts that the usage period is an important factor affecting user loyalty intentions. Additionally, user-to-user relationship is expected to have a significant effect on loyalty intentions. Various interactions occur among freemium application users, whereas such interactions have not been considered in previous studies because there were fewer user-to-user interactions [Woisetschläger et al. 2011]. Hence, this study examines the influence of both user-to-business relationships and user-to-user relationships.

2.4. Marketplace Characteristics

Marketplace characteristics reflect the relationship among users, incumbent companies, and competing companies. Users often cannot switch to a product or service of a competing company because of high switching costs, the high service quality of the current company, or the complexity of switching. The existing literature considered diverse marketplace characteristics including switching cost [Burnham et al. 2003; Jones et al. 2000], convenience, competitive intensity [Seiders et al. 2005; Voss et al. 2010], satisfaction with competitors [Bowman and Narayandas 2004], and service quality [Bolton et al. 2008].

Among various marketplace characteristics, this study investigates the effect of alternative attractiveness, switching cost, relative advantage, and value for money. Switching cost and alternative attractiveness influence the user choices among alternatives existing in the marketplace. Relative advantage and the value for money of the software application in use are expected to affect purchase decisions on premium features of freemium applications. Relative advantage is a benefit of premium features compared to basic features provided free of charge. Recently, freemium software providers were concerned because many functions are provided free of charge, which leads to cannibalization of the demand for premium features [Kumar 2014]. Hence, if there is little relative advantage to using a premium version compared to the free version, no reason exists for users to spend money on premium features. Value for money has recently been studied as a significant factor affecting purchase behavior in mobile application and in-app-purchases [Hsiao and Chen 2016; Hsu and Lin 2015]. If premium features are too expensive or not worth the expense, users will have no intention of paying for the features. In the context of freemium software, relative advantage and value for money are expected to influence purchase intention.

2.5. Complementary and Substitutive Interactions

Seiders et al. [2005] paid attention to the interactions between satisfaction and the characteristics rather than focusing on the direct effect of the characteristics on loyalty intention. User characteristics, relational characteristics, and marketplace characteristics interact with satisfaction and either enhance or diminish the effect of satisfaction on loyalty intention. When satisfaction and one of the characteristics interact, they interact as either substitutes or complements [Voss et al. 2010]. Substitutive interaction occurs when the effect of a variable on the dependent variable diminishes or disappears as the level of the other variable increases due to a decrease in the marginal benefit of the variable. For example, users who use a service with a high switching cost repurchase the service even when the level of satisfaction is low, which indicates that the effect of satisfaction vanishes according to the degree of switching cost [Jones et al. 2000]. Complementary interaction is the opposite; an increase in one variable leads to an increase in the marginal benefit of the other variable enhancing its effect on the dependent variable. For instance, as the duration of the relationship between a user and a company increases, the user gains confidence in the usage experience, and the effect of satisfaction on loyalty intention is enhanced [Bolton 1998]. In this study, we examine the direct effect of characteristics on loyalty intention and the interaction effects with satisfaction.

2.6. User Loyalty Intentions

In recent decades, several studies have emphasized the relationship between satisfaction and user loyalty intentions. Researchers have studied how satisfaction affects different types of loyalty intentions. The studied loyalty

intentions includes repurchase intention, intention to stay with the incumbent provider and user retention [Agustin and Singh 2005; Bolton 1998; Burnham et al. 2003; Jones et al. 2000; Mittal and Kamakura 2001]; repurchase visits and share of visits [Mägi 2003; Seiders et al. 2005; Voss et al. 2010]; spending, share of wallet, and the number of services purchased [Agustin and Singh 2005; Bowman and Narayandas 2001; Mägi 2003; Seiders et al. 2005; Verhoef 2003; Voss et al. 2010], and user referrals and intention to recommend [Mittal et al. 1999; Verhoef et al. 2002]. Although research contexts and the details of the studies differ from study to study, the studied loyalty intentions can be classified into four patterns such as retaining the incumbent relationship, increasing re-visits, more spending, and recommendations to others. Satisfaction has had various effects on loyalty intentions alongside the stated three characteristics in different contexts. Some studies found significant satisfaction-loyalty relationships, but others found that satisfaction explains some of the behaviors or does not explain any of the behaviors [Mägi 2003; Verhoef 2003].

This study considers two types of loyalty intentions as dependent variables: continuance intention and intention to purchase premium features. From the first use of freemium applications, users of freemium applications can either continue to use the free version (continuance) or purchase additional features (intention to purchase). Continuance has been studied in the field of IS for a long time as a repurchase behavior. Bhattacharjee [2001b] described similarity between continuance and repurchase behavior because they both follow initial decisions (i.e., acceptance or purchase) that are affected by initial usage and can lead to reversal decisions. Freemium software users, based on their experiences after the adoption of an application, make decisions as to whether to continue their usage. Additionally, users decide whether to purchase premium features after using the free version. Existing studies related to the freemium context have insisted that usage experience of free versions positively influences premium version subscriptions [Doerr et al. 2013; Wagner et al. 2014]. This study examines the effect of satisfaction on two loyalty intentions considering the use context of freemium software (Figure 1).

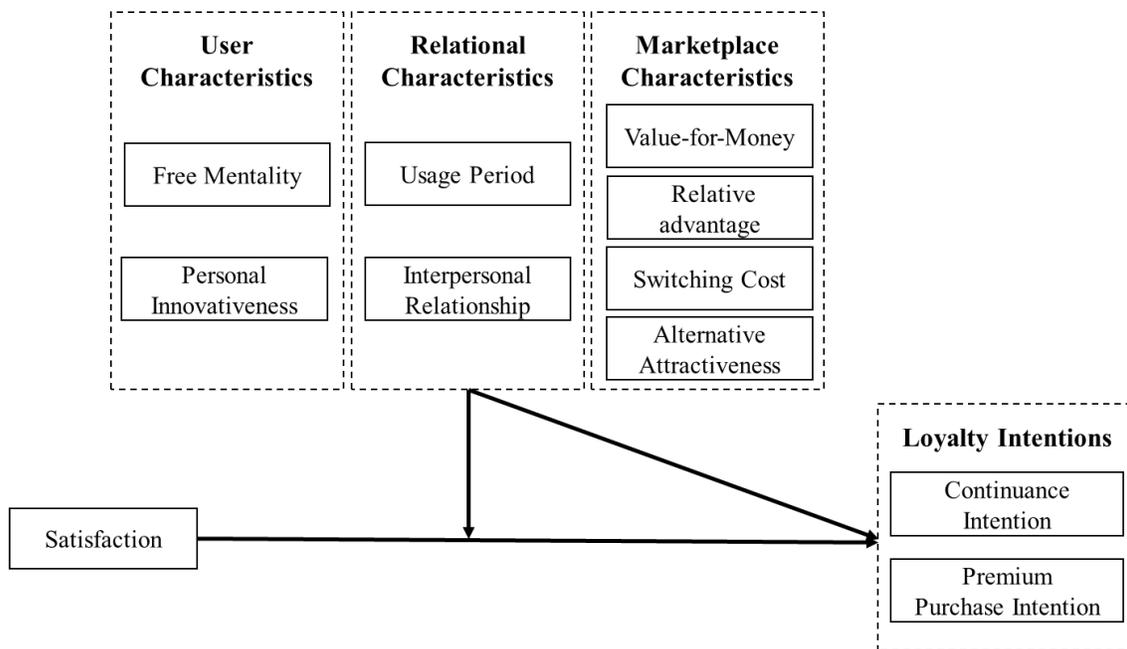


Figure 1: Research Framework

3. Hypotheses

3.1. Satisfaction-Loyalty

Satisfaction is defined as an overall evaluation of a product or service developed from the consumption experience over time [Anderson et al. 1994; Fornell 1992]. Satisfaction has been considered a key factor in explaining user loyalty [Cooil et al. 2007]. Previous literature provides empirical evidence for the relationship between satisfaction and loyalty intention [Anderson et al. 1994; Jones et al. 2000].

User loyalty has also been the focus of IS researchers. After the pioneering study of Bhattacharjee [2001b], several studies on IS continuance emerged. According to the literature, satisfaction with prior IS usage primarily determines the users' intention to continue their usage of the IS [Lin et al. 2005; Stone and Baker-Eveleth 2013; Thong et al. 2006]. Loyalty intention is not only confined to continued usage; purchase intention is also affected by satisfaction

[Choi et al. 2017; Flavián et al. 2006]. For freemium software, satisfaction affects users' intention to purchase paid versions of software applications [Hsu and Lin 2015]. Thus, the following hypothesis is proposed.

H1a: Satisfaction has positive effects on continuance intention.

H1b: Satisfaction has positive effects on intention to purchase.

3.2. User Characteristics

Free mentality

Providing content for free is a well-known business model mainly applied to TV and radio. Content providers have profited from advertisements instead of offering free content, whereas users have only paid for the media instead of buying content [Lin et al. 2013]. This trend has continued even after the diffusion of the Internet as content providers have focused on attracting new users through free content instead of charging for content to gain fees for advertising. Providing online content for free has become the norm [Dou 2004].

Users expect to pay for physical products. However, users expect intangible products provided through the Internet including software, video, and music to be free or inexpensive. This free mentality, defined as "a strong belief that everything online should be free," [Lin et al. 2013] has been reinforced by a number of no-cost online services. Because online users have become accustomed to free services, it has now become extremely difficult to change their attitudes [Lyons et al. 2012]. According to Ye et al. [2004], users believe that better services should provide more value although they have no intention of paying for such services since most online services have been offered free of charge. Overall, users with a high free mentality have a positive opinion of free offerings and intend to continue usage of free software. However, users resist when it comes to paying for additional features. Thus, the following hypotheses are proposed.

H2a: Free mentality has a positive effect on continuance intention.

H2b: Free mentality has a negative effect on intention to purchase.

Users with a relatively lower free mentality are more willing to pay an adequate amount for a better service when they are satisfied. In other words, users intend to pay for additional services if their experiences with free offerings are satisfactory. However, users with a high free mentality are not likely to change their belief that every service on the Internet should be provided free of charge even if the services fulfill their needs. Such users might choose to continue to use the free version. Additionally, users with a high free mentality seek out free applications. These users continue to use the free version although the usage experience is somewhat unsatisfactory. Thus, the following hypotheses are proposed.

H2c: Free mentality has a negative moderating effect on the satisfaction - continuance intention relationship.

H2d: Free mentality has a negative moderating effect on the satisfaction - intention to purchase relationship.

Personal Innovativeness

Personal innovativeness is a conceptual construct that indicates "the willingness of an individual to try out any new information technology." [Agarwal and Prasad 1998] Users with high personal innovativeness have a more favorable attitude toward novel technology [Rogers 1995], show early adopter characteristics, and enjoy solving problems in a unique way [Dabholkar and Bagozzi 2002]. In addition, instead of sharing experiences with others, innovative people have a tendency to make independent innovative decisions [Midgley and Dowling 1978].

Innovativeness is considered an important construct, which has the potential to explain innovation adoption. Agarwal and Prasad [1998] insisted that innovativeness plays the role of a key moderator between perception and consequences. Users with high innovativeness can endure a higher level of uncertainty compared to the majority of users [Rogers 1995]. Since more innovative users take relatively more risks, they tend to form a more positive attitude toward new technologies and services. Innovative users seek out new technology to experiment. Thus, the following hypotheses are proposed.

H3a: Personal innovativeness has a positive effect on continuance intention.

H3b: Personal innovativeness has a positive effect on intention to purchase.

Consequently, innovativeness strengthens the relationship between perception and intention [Martín and Herrero 2012]. Among users with the same level of perception, those with more innovativeness have greater innovation adoption intention. These users are likely to accept that sacrifice arises from using a new system [Agarwal and Prasad 1998]. Paying for additional service features is not a traditional way to consume. Hence, payment for additional services is not a familiar behavior among most users. Most users only use basic service features and do not pay additional fees for premium versions. However, it is likely that a user with a high level of innovativeness form an intention to pay even in cases where other users do not have any intention to purchase. Users with higher levels of innovativeness form a higher level of willingness to pay even when every user exhibits the same degree of satisfaction. Thus, the following hypotheses are proposed.

H3c: Personal innovativeness has a positive moderating effect on the satisfaction - continuance intention relationship.

H3d: Personal innovativeness has a positive moderating effect on the satisfaction - intention to purchase relationship.

3.3. Relational Characteristics

Usage period

The relationship between a company and a user has evolutionary characteristics and varies as the relational period lengthens. Users develop and reinforce their relationship with companies through continuous interactions that, in turn, improve user loyalty [Anderson and Sullivan 1993]. Based on a series of interactions, users evaluate products or the company itself. Users can properly evaluate software applications as the usage period lengthens because the true value of the product is recognized only with experience [Chellappa and Shivendu 2005]. Experience attributes affecting users' purchase intention are evaluated during the usage period [Yan and Wakefield 2015]. As users use the service more, they are more likely to have loyalty intentions. Thus, the following hypotheses are proposed.

H4a: Usage period has a positive effect on continuance intention.

H4b: Usage period has a positive effect on intention to purchase.

As the usage period lengthens, users gain assurance with their own evaluation. Even if such evaluations are wrong or inaccurate, users tend to gain confidence [Verhoef et al. 2002]. Hence, the longer the experience or relationship, the stronger the influence of user satisfaction. Previous empirical results indicated that relationship age positively moderates the relationship between satisfaction and relationship duration [Bolton 1998], the number of services purchased [Verhoef et al. 2002], and user retention [Verhoef 2003]. Thus, the following hypotheses are proposed.

H4c: Usage period has a positive moderating effect on the satisfaction - continuance intention relationship.

H4d: Usage period has a positive moderating effect on the satisfaction - intention to purchase relationship.

Interpersonal Relationship

Interpersonal relationship, which is considered an important construct explaining user loyalty, is formed between a user and a company or among users [Guenzi and Pelloni 2004]. Previous research that focused on the relationship between users and service providers suggests that users did not switch from one service provider to another because of personal bonds with salespersons or account managers [Bowman and Narayandas 2004; Burnham et al. 2003; Jones et al. 2000].

In contrast, only a few papers have considered user-to-user interactions because there have been limited opportunities for users to form meaningful interactions with other users [Woisetschläger et al. 2011]. However, the opportunities for user-to-user interactions have recently increased. By forming a group for a certain brand, users share consumption activities and interact with one another [McAlexander et al. 2002; Schouten and McAlexander 1995]. While existing literature has emphasized the social benefit, which is separated from the direct benefit from a product or service [Frenzen and Davis 1990], recent software applications that fully utilize social networks enhance the usage experience through interactions among users. Users using the same application can now co-operate at a distance, share files, and play games together, which are various means of enhancing the interaction among users. Such improvements have led to an increase in benefits caused by interactions and relationships.

Once a specific group is formed through user interactions, users become reluctant to abandon the group, which eventually creates a barrier preventing users from switching to other providers [Wathne et al. 2001]. Some studies assert that users lose benefits that they have gained from a relationship when they switch from one service provider to another [Jones et al. 2000; Tsai et al. 2006]. The switching barrier is particularly reinforced by existing interpersonal relationships. For software applications, users lose their personal relationships but also their working tools and shared working place with co-workers. Therefore, users with more interpersonal relationships within the applications tend to continue their usage rather than lose the benefits of the relationships.

Users using freemium applications inevitably face shortages in storage or the need for additional features. Users with many interpersonal relationships purchase additional storage or features instead of switching to other alternatives because of high relational cost arising from the interpersonal relationships. In addition, users select the same choices even if the satisfaction with the current software applications is low reducing the effect of satisfaction [Woisetschläger et al. 2011]. Thus, the following hypotheses are proposed.

H5a: Interpersonal relationships have a positive effect on continuance intention.

H5b: Interpersonal relationships have a positive effect on intention to purchase.

H5c: Interpersonal relationships have a negative moderating effect on satisfaction - continuance intention relationship.

H5d: Interpersonal relationships have a negative moderating effect on satisfaction - intention to purchase relationship.

3.4. Marketplace Characteristics

Alternative attractiveness

Alternative attractiveness refers to the user's sense of how many alternatives are available in the marketplace [Jones et al. 2000]. Users tend to remain in the current relationship if they cannot find an appropriate alternative. Thus, a user's repurchase behavior is the outcome caused by the absence or presence of possible alternatives or significant differences among alternatives not the level of satisfaction in the current relationship [Colgate and Lang 2001]. With no alternative to fulfill a need, users have no option but to remain with the current option.

When a relationship with a product or service is unsatisfactory, a user can switch from an old product or service to a new one if there is a suitable alternative. However, if there is no alternative, the user has to remain in the current unsatisfactory relationship [Patterson and Smith 2003]. An assumption, therefore, is that a user's satisfaction does not exert a significant influence on the relationship if an alternative exists [Sharma and Patterson 2000]. In case of freemium applications, users switch to other free alternative applications or cheaper alternatives instead of purchasing the premium version of a software when they are dissatisfied. On the other hand, if there is no available alternative, users continue using the current application and purchase additional features. Thus, the following hypotheses are proposed.

H6a: Alternative attractiveness has a negative effect on continuance intention.

H6b: Alternative attractiveness has a negative effect on intention to purchase.

H6c: Alternative attractiveness has a negative moderating effect on the satisfaction - continuance intention relationship.

H6d: Alternative attractiveness has a negative moderating effect on the satisfaction - intention to purchase relationship.

Switching cost

Switching cost refers to the cost of switching from one provider to another. Switching cost includes monetary and search and evaluation costs from finding an alternative, the setup cost of the alternative, and the learning cost to use the alternative effectively [Burnham et al. 2003; Tsai et al. 2006]. When a user purchases a product, continuous usage builds familiarity with the product. Since users often face the learning process after the product is purchased, they are typically locked in their existing relationship instead of attempting to buy alternative products [Balabanis et al. 2006; Shapiro and R.Varian 1999]. In case of freemium software applications, users become familiar with the interface and instructions but also save various types of information in the companies' servers. When a user decides to switch to an alternative service, the user must become familiar with the new service and transfer all data from the previous server to a new server. To avoid this complex and tedious process [Woisetschläger et al. 2011], users continue to use current applications and pay for additional features or storage capacity rather than finding an alternative and switching. Thus, the following hypotheses are proposed.

H7a: Switching cost has a positive effect on continuance intention.

H7b: Switching cost has a positive effect on intention to purchase.

With low switching costs, users can choose to remain or switch according to their satisfaction level from the previous usage [Sharma and Patterson 2000]. However, as users maintain a relationship with current providers, switching costs increase [Coil et al. 2007], and the increased switching cost outweighs the benefits of switching. Although a user has a low satisfaction level, the user with a high switching cost is compelled to maintain the relationship with an incumbent provider because the switching cost outweighs the benefits of switching [Jones et al. 2000]. Thus, the following hypotheses are proposed.

H7c: Switching cost has a negative moderating effect on the satisfaction - continuance intention relationship.

H7d: Switching cost has a negative moderating effect on the satisfaction - intention to purchase relationship.

Relative advantage

Providing free versions of software applications is an effective strategy that reduces the uncertainty of users and promotes the diffusion of software applications [Cheng and Liu 2012]. However, the strategy can cause reverse effects. Providing more features for free users creates perceptions among users of the value of the premium version [Wagner et al. 2014] while reducing the reasons to purchase the additional features. Users who are satisfied with the free offerings continue to use the free versions of the software rather than paying for additional features. Free offerings can cannibalize the demand for paid features [Cheng and Tang 2010]. For example, the New York Times provided 20 free articles per month, and users who wanted to read more articles had the option to convert to paid subscriptions. However, subscribers read no more than 20 articles and showed no intention to pay for a premium subscription. The company recognized that it was providing too many free articles and reduced the number from 20 to 10 in 2012 [Kumar 2014]. Evernote also limited the maximum number of devices allowed for basic plan users from an unlimited number to two. With experience, freemium providers have recognized the importance of the differences between free offerings and paid offerings.

Relative advantage refers to "the degree to which an innovation is perceived as being better than its precursor" [Moore and Benbasat 1991]. Relative advantage has been considered a main factor explaining users' innovation

adoption behavior [Agarwal and Prasad 1998]. Here, relative advantage compares between free offerings and paid features of software applications. If free offerings are enough for users, and there is no difference between free features and paid features, users have no reason to pay for additional features. Users who perceive more relative advantage from paid features have purchase intention. Additionally, satisfaction from the usage experience reinforces the effect of relative advantage. Users with higher satisfaction levels may have purchase intention for additional features and if they perceive higher benefit from the features. Thus, the following hypotheses are proposed.

H8a: Relative advantage has a positive effect on intention to purchase.

H8b: Relative advantage has a positive moderating effect on the satisfaction - intention to purchase relationship. Value/price for money

Value for money refers to user perception of the monetary value of paid services of freemium software [Hsiao and Chen 2016]. This concept concerns whether products are reasonably priced and economical [Sweeney and Soutar 2001]. Users have different perceptions on the value of paid features, and the perceived value determines the users' willingness to pay for the features. If the price of the features is less than users' willingness to pay, the users have intention to pay for the features. The effect of value for money on purchase intention has been empirically demonstrated by previous studies [Hsiao and Chen 2016; Hsu and Lin 2015; Lu and Hsiao 2010]. In addition, a "value for money" perception has a moderating effect on the relationship between satisfaction and purchase intention. When users are satisfied, they would have more intention to purchase if the additional features are well priced.

H9a: Value for money has a positive effect on intention to purchase.

H9b: Value for money has a positive moderating effect on the satisfaction - intention to purchase relationship.

Table 1 presents the summary of proposed hypotheses.

Table 1: Summary of Hypotheses

Independent Variables	Dependent Variables	
	Continuance Intention	Intention to Purchase
Satisfaction (SAT)	H1a (+)	H1b (+)
Free Mentality (FM)	H2a (+)	H2b (-)
Innovativeness (INNO)	H3a (+)	H3b (+)
Usage Period (UP)	H4a (+)	H4b (+)
Interpersonal Relationship (IR)	H5a (+)	H5b (+)
Alternative Attractiveness (AA)	H6a (-)	H6b (-)
Switching Cost (SC)	H7a (+)	H7b (+)
Relative Advantage (RA)		H8a (+)
Value for Money (VM)		H9a (+)
FM × SAT	H2c (-)	H2d (-)
INNO × SAT	H3c (+)	H3d (+)
UP × SAT	H4c (+)	H4d (+)
IR × SAT	H5c (-)	H5d (-)
AA × SAT	H6c (-)	H6d (-)
SC × SAT	H7c (-)	H7d (-)
RA × SAT		H8d (+)
VM × SAT		H9d (+)

4. Research Method

4.1. Data

We tested our research model by surveying freemium software application users. Among software applications that are available in the marketplace, "Evernote," a note-taking productive application, and "Clash of Clans," a free-to-play game, were selected as the representative of freemium applications. Worldwide, Evernote and Clash of Clans retain over two billion users and one billion users, respectively. Hence, we concluded that "Evernote" and "Clash of Clans" have sufficient capacities because of their worldwide popularity and extremely high number of users.

To test our hypotheses, we employed a web-based survey. We selected Amazon Mechanical Turk, a web platform where requesters upload jobs and users can freely participate to solve problems. Questionnaires were posted on the web page for a week in January 2017. A total number of 429 respondents and 480 respondents participated in the surveys for "Evernote" and "Clash of Clans," respectively. By completing a survey, a participant received some cash usable on the website for compensation.

Our survey was only for the active application users and, to prevent invalid responses, the questionnaires included verifying questions. The following are verifying questions posed to survey participants: "Which plan do you use now?"

“What is the maximum number of devices available for the basic plan?” “What is the name of the animal on the Evernote logo?” “What is your town hall level?” “To which league level do you belong?” “What is the name of the third unit you can produce?” Questionable responses were screened out prior to the analysis based on several criteria. Responses from participants who were assumed to be fake users based on their answers to verifying questions were excluded (e.g., invalid or wrong answers to verifying questions, longer usage period than the application’s period of existence). In addition, responses from participants who appeared to just skim through the survey (e.g., all the answers were the same) were removed.

After the data preprocessing, 326 valid samples were obtained from the survey for “Evernote,” whereas 387 valid samples were obtained for “Clash of Clans.” A total of 713 responses were found to be valid after eliminating 196 invalid responses where participants either completed surveys indiscriminately or had no usage experience with the software.

The respondents were primarily men (67.32%) between the ages of 20 and 39 years (88.08%) with at least some college education, or they were in the process of obtaining a college education (91.73%). On average, respondents had experience using freemium software for approximately 15 months and spent around \$63 on premium features of the software (Table 2). Demographic characteristics of the samples may be different from the population because the survey was conducted on one platform only and confined to the platform users. Thus, we compared the characteristics of the samples with the known characteristics (over 60% of users are male, majority of users are in their 20s and 30s and subscribe basic plans) of the population to see if there is a sampling bias. Noticeable difference between population and samples was not identified while comparing characteristics.

Table 2: Respondents Characteristics ($n = 713$)

Characteristics	Frequency	Percentage
Gender		
Male	480	67.32
Female	233	32.68
Age		
< 20	12	1.68
20’s (20 – 29)	407	57.08
30’s (30 – 39)	221	31.00
40’s (40 – 49)	51	7.15
> 49	22	3.09
Education		
High School Graduate or under	59	8.27
College Student	131	18.37
Bachelor’s Degree	337	47.27
Graduate Student	62	8.70
Master’s Degree or Above	124	17.39
Annual Income		
< \$20,000	211	29.59
\$20,000 - \$29,999	158	22.16
\$30,000 - \$39,999	100	14.03
\$40,000 - \$49,999	70	9.82
\$50,000 - \$59,999	64	8.98
\$60,000 - \$69,999	42	5.89
> \$69,999	68	9.53

4.2. Measurement Items

Measurement items were presented in Appendix. Loyalty intentions were divided into two constructs of continuance and intention to purchase. Items for continuance were adapted from Bhattacharjee [2001b]. Respondents were asked to rate their intention to continuously use their current applications. The intention to purchase scale was taken from Hsu and Lin [2015] measuring users’ intention to purchase premium features. The satisfaction scale was adapted from Bhattacharjee [2001a] and Flavián et al. [2006]. Respondents rated their perceived satisfaction level of the application services.

Personal innovativeness and the free mentality of respondents were examined for user characteristics. Items for personal innovativeness were adopted from Agarwal and Prasad [1998]. Respondents were asked to rate their

likelihood of trying a new information technology. The free mentality scale was adopted from Lin et al. [2013]. The scale measured respondents' beliefs concerning the free use of software.

Usage period and interpersonal relationship were investigated to represent relational characteristics. The usage period scale measured how many months the respondents had used the applications. The items for interpersonal relationships were taken from Jones et al. [2000]. Respondents were instructed to evaluate interpersonal relationships among the application users.

Finally, for marketplace characteristics, we examined switching cost, alternative attractiveness, relative advantage, and value for money. The switching cost scale was adapted from Jones et al. [2000], which measures overall perception of the effort and cost required during application switching. Alternative attractiveness measures were from Jones et al. [2000] and Sharma and Patterson [2000]. Respondents were asked to evaluate the availability of alternatives in the marketplace. The relative advantage items, taken from Venkatesh et al. [2003], measured the difference between free offerings and premium offerings of the applications. The value for money scale was adapted from Hsu and Lin [2015]. Respondents were instructed to rate how economical they considered the premium features to be. All items except usage period were measured on a seven-point Likert scale, ranging from (1) "strongly disagree" to (7) "strongly agree."

We conducted confirmatory factor analysis (CFA) for each set of answers to verify the reliability and validity of constructs using Smart PLS. Using three calculated metrics, including average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha, we evaluated the convergent validity of constructs, which is presented in Table 3. In line with previous literature [Fornell and Larcker 1981; Nunnally 1978], which suggested acceptable criteria for convergent validity metrics, all of the AVEs, CRs, and Cronbach's alphas of constructs were greater than 0.5, 0.7, and 0.7 respectively, confirming the convergent validity. Thus, we conclude that the required convergent validity and reliability for the proposed model were met.

Discriminant validity can be assessed by comparing the square root of AVE of each construct with the correlation [Fornell and Larcker 1981]. The square root of AVEs should be greater than the correlations [Chin 1998; Jöreskog and Sörbom 1996]. In addition, each item should possess the highest loading with its corresponding construct. Discriminant validity was confirmed to be acceptable (Table 4).

Table 3: Reliability of Constructs

Construct	Mean	Std. Dev.	Cronbach's Alpha	Composite Reliability	AVE
Alternative Attractiveness (AA)	4.34	1.15	0.80	0.87	0.63
Continuance Intention (CON)	5.36	1.19	0.87	0.92	0.79
Free Mentality (FM)	5.49	1.09	0.80	0.88	0.72
Innovativeness (INNO)	5.49	1.06	0.77	0.87	0.69
Intention to Purchase (IP)	3.73	1.61	0.93	0.95	0.82
Interpersonal Relationship (IR)	4.38	1.55	0.91	0.93	0.73
Relative Advantage (RA)	4.94	1.41	0.92	0.94	0.77
Satisfaction (SAT)	5.62	1.02	0.89	0.93	0.76
Switching Cost (SC)	4.50	1.45	0.84	0.90	0.76
Usage Period (UP)	14.86	13.80	-	-	-
Value for Money (VM)	4.08	1.51	0.91	0.94	0.80

Table 4: Validity of Constructs

Construct	AA	CON	FM	INNO	IP	IR	RA	SAT	SC	UP	VM
AA	0.79										
CON	-0.39	0.89									
FM	0.02	0.13	0.85								
INNO	-0.06	0.31	0.22	0.83							
IP	-0.09	0.38	-0.12	0.18	0.91						
IR	-0.04	0.29	0.13	0.27	0.40	0.86					
RA	0.12	0.19	-0.01	0.22	0.43	0.41	0.88				
SAT	-0.30	0.62	0.23	0.34	0.22	0.24	0.12	0.87			
SC	-0.24	0.49	0.02	0.12	0.39	0.20	0.11	0.23	0.87		
UP	-0.16	0.19	0.01	0.08	-0.11	-0.05	-0.08	0.20	0.11	-	
VM	-0.10	0.35	-0.09	0.16	0.71	0.29	0.33	0.22	0.38	-0.06	0.89

Notes: Diagonal elements (in bold and italic) are the square root of the average variance extracted (AVE); off-diagonal elements are the correlations among constructs; for discriminant validity, diagonal elements should be larger than off-diagonal elements.

4.3. Analysis Method

We tested the multiple hypotheses by modeling and running a series of linear regression analyses. Through a series of regression analyses, we present the non-standardized coefficients and *t*-values for regression models including the results of interaction terms, which were hypothesized earlier in the paper. Each model was computed to be significant ($p < 0.001$) with *R*-square values higher than 0.55. To detect multicollinearity, Variance Inflation Factors for each model were calculated. VIFs over 10 are signs of multicollinearity [Hair et al. 1998] while the largest VIFs of each model were 1.61 and 1.90 which are acceptable (Appendix B).

5. Results

5.1. Direct Effect

For the continuance intention model, six of the seven antecedents (satisfaction, innovativeness, interpersonal relationship, alternative attractiveness, switching cost, and usage period) were observed to have significant direct effects on continuance. Satisfaction ($t = 12.155, p < .001$), personal innovativeness ($t = 2.724, p < .01$), interpersonal relationship ($t = 4.053, p < .001$), switching cost ($t = 11.605, p < .001$) and usage period ($t = 1.755, p < .01$) form positive relationships with continuance intention, whereas alternative attractiveness ($t = -5.679, p < .001$) exerted a negative influence on continuance intention. Hence, H1a, H3a, H4a, H5a, H6a, and H7a were supported (Table 5).

In the intention to purchase model, different main effects were observed to be significant compared to the continuance intention model. The effects of free mentality, interpersonal relationship, switching cost, relative advantage, value for money, and usage period were found to be significant in the model. Interpersonal relationship ($t = 5.070, p < .001$), switching cost ($t = 5.030, p < .001$), relative advantage ($t = 6.095, p < .001$), and value for money ($t = 18.412, p < .001$) exerted positive influences on the intention to purchase, whereas free mentality ($t = -3.479, p < .001$) and usage period ($t = -3.249, p < .001$) formed negative relationships with the intention to purchase. Although we expected usage period to have a positive influence on the intention to purchase, the result was contrary to the prediction. In conclusion, H2b, H5b, H7b, H8b, and H9a receive support from the analysis.

Table 5: Regression Analysis for the Research Model

Independent Variables	Continuance Intention				Intention to Purchase		
	Coefficient	<i>t</i> -value	Hypothesis	Coefficient	<i>t</i> -value	Hypothesis	
Satisfaction (SAT)	0.44 ***	12.15	H1a	0.07	1.51	H1b	
Free Mentality (FM)	0.01	0.42	H2a	-0.13 ***	-3.48	H2b	
Innovativeness (INNO)	0.08 **	2.72	H3a	0.02	0.47	H3b	
Usage Period (UP)	0.00 †	1.75	H4a	-0.01 ***	-3.25	H4b	
Interpersonal Relationship (IR)	0.08 ***	4.05	H5a	0.15 ***	5.07	H5b	
Alternative Attractiveness (AA)	-0.16 ***	-5.68	H6a	-0.02	-0.48	H6b	
Switching Cost (SC)	0.25 ***	11.61	H7a	0.15 ***	5.03	H7b	
Relative Advantage (RA)				0.20 ***	6.10	H8a	
Value for Money (VM)				0.56 ***	18.41	H9a	
FM × SAT	-0.01	-0.34	H2c	-0.03	-0.74	H2d	
INNO × SAT	0.00	0.10	H3c	0.07 †	1.72	H3d	
UP × SAT	0.00	0.47	H4c	0.00	-0.12	H4d	
IR × SAT	-0.07 ***	-3.28	H5c	-0.05 †	-1.92	H5d	
AA × SAT	-0.03	-1.30	H6c	-0.05	-1.28	H6d	
SC × SAT	-0.09 ***	-4.74	H7c	-0.03	-1.20	H7d	
RA × SAT				0.08 *	2.46	H8b	
VM × SAT				0.01	0.20	H9b	
Model <i>F</i> value	71.89 ***			26.70 ***			
Adjusted <i>R</i> ²	0.56			0.60			

Notes: † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Significant relationships and supported hypotheses are in bold for clarity.

5.2. Interaction Effect

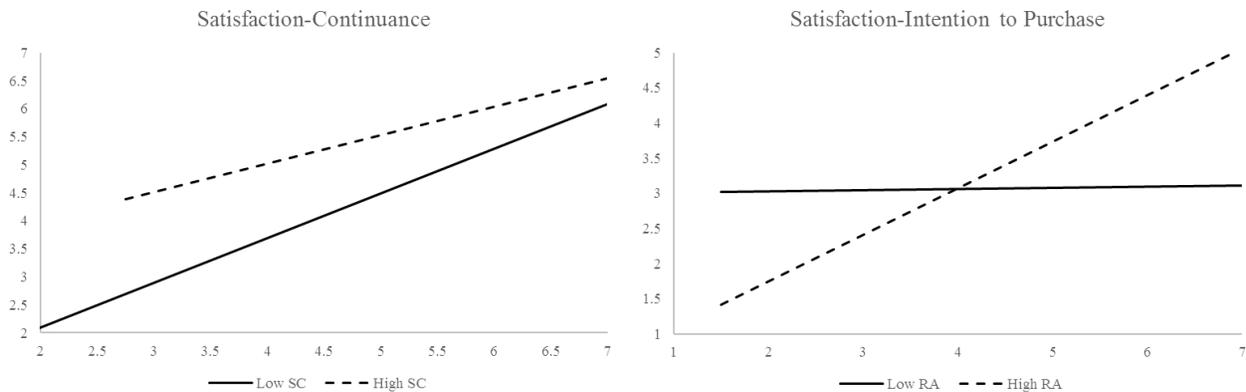
In the continuance intention model, two of the six hypothesized interactions appear to be significant (satisfaction × interpersonal relationship and satisfaction × switching cost). Supporting the proposed hypotheses, the coefficients of both interaction terms have negative signs as expected. On the other hand, three of the eight hypothesized interaction terms are verified as significant in the intention to purchase model (satisfaction × innovativeness, satisfaction × interpersonal relationship, and satisfaction × relative advantage). In support of the proposed hypotheses, all of the interaction terms have the same signs as hypothesized. Hence, H5c, H7c, H3d, H5d, and H8b were supported.

For H3d, personal innovativeness has a positive effect on the relationship between satisfaction and intention to purchase ($t = 1.716, p < .1$). This implies that among users with the same satisfaction level, those with higher personal innovativeness have more intention to purchase premium features.

Supporting H5c and H5d, interpersonal relationships have negative effects on the relationship between satisfaction and continuance intention ($t = -3.281, p < .001$) and between satisfaction and intention to purchase ($t = -1.922, p < .1$). Hence, users with have many interpersonal relationships continue using the current applications and have premium purchase intention regardless of the satisfaction level.

For continuance model, the interaction term of satisfaction and switching cost are found to be significant ($t = -4.735, p < .001$) supporting H7c. This result indicates that users with high switching costs reluctantly continue to use the software applications even if they are far from being satisfied.

For H8b, relative advantage enhances the relationship between satisfaction and intention to purchase ($t = 2.456, p < .05$) as expected. Users who are satisfied with the software applications have more intention to purchase premium features when there is a greater gap between the free version and the premium version. Figure 2 shows some of the moderated relationships.



Note: Plots are based on trichotomized switching cost and relative advantage (the upper third and lower third of the data were used) to accurately reflect the effect of interactions (SC: Switching Cost, RA: Relative Advantage).

Figure 2: Substitutive and Complementary Interaction Effect

6. Discussion

6.1. Satisfaction and Loyalty

In the IS context, the relationship between satisfaction and continuance intention has long been studied in the previous literature [Bhattacharjee 2001b]. This relationship was also confirmed in the current study. As predicted, a positive association between satisfaction and continuance intention was observed. However, there was no significant link between satisfaction and intention to purchase. For freemium software, this results suggest that satisfying usage experience does not necessarily lead to purchase behavior since users are already satisfied with their experience with the free version. Several studies have asserted that satisfaction may not have a direct effect on loyalty intention in a few specific contexts [Mittal and Kamakura 2001; Nagengast et al. 2014; Seiders et al. 2005; Voss et al. 2010; Yi and La 2004]. Thus, we conclude that satisfaction interacts with other explanatory variables causing indirect effects on intention to purchase rather than causing direct effects.

6.2. User Characteristics

In recent decades, many online software applications have been provided free of charge to users, convincing users that online software applications should be free and users do not have to pay for or purchase applications. Such a free mentality has affected several online users and, in turn, has a negative effect on intention to purchase. Consistent with the previous literature, free mentality was found to have a negative effect on intention to purchase. However, since

users take free-of-charge software for granted, continuance intention of freemium applications, whose basic versions are provided free of charge, is not influenced by the degree of free mentality. Rather, users can switch to an alternative since they now have a variety of choice in other free applications.

Free mentality did not moderate the relationship between satisfaction and loyalty intentions. Previously, Lin et al. [2013] examined the effect of free mentality on the relationship between perceived benefit/cost and payment attitudes. The authors found only effect on the cost-attitude relationship to be significant. Free mentality refers to the belief that everything provided online should be free, and the concept should be viewed from the perspective of cost rather than benefit. If users should pay for applications, users are willing to pay for what could have been avoided strengthening the effect of the cost. Users take services that are provided free of charge for granted; thus, free services do not enhance the effect of the benefit. Since free mentality enhances the negative perspective of experience, it does not moderate the relationship between satisfaction and loyalty intention, which represents the positive side of experience.

Consistent with the prediction, personal innovativeness has a positive effect on continuance intention. However, we were unable to observe any relation between innovativeness and purchase intention. Innovative users intend to use an application, but they do not want to pay for additional features as many software applications are introduced to the marketplace every day. Although no direct effect was found, personal innovativeness strengthens the relationship between satisfaction and intention to purchase. Among the users with the same satisfaction level, innovative users have more intention to purchase additional features.

6.3. Relational Characteristics

Consistent with our prediction, usage period was found to have a positive influence on continuance intention, supporting our hypothesis. The longer a user uses an application, the greater the likelihood of continued use. Interestingly and unexpectedly, usage period was negatively related with intention to purchase. This result was obtained because of user adaptation to applications over time. As a user uses an application over time, the user becomes well adapted to free features and effectively uses them. Hence, users do not need to spend additional features as the usage period lengthens, which accounts for the negative sign of the coefficient in the purchase intention model. Contrary to the direct effect, we could not observe any effect of usage period on loyalty intention.

In prior research, testing interpersonal relationships or relational switching cost often showed contradictory results according to the context of the study. For example, interpersonal relationships had no direct effect on repurchase intention, but diminished the relationship between satisfaction and repurchase intention in the context of banking and hair styling [Jones et al. 2000]. On the other hand, relational switching cost only had a moderating effect on the relationship between satisfaction and repurchase intention with no direct effect on repurchase intention in the context of credit card usage and telephone usage [Burnham et al. 2003]. Thus, the usage context is thought to be a critical factor that determines the effects of antecedents.

Interpersonal relationships had both direct and moderating effect on loyalty intentions in our study, which focused on freemium software users. Users with a high level of interpersonal relationships tend to continue their usage irrespective of satisfaction level. Users cannot abandon their current software application due to several co-workings and co-operations through the software. Switching to an alternative software application is almost impossible regardless of the satisfaction level if there are many or important interpersonal relationships. In addition, we conclude that interpersonal relationships lead to more spending on premium features. Users pay for premium features even though the software application is not satisfactory because of a high relational switching cost.

6.4. Marketplace Characteristics

Alternative attractiveness refers to the user's sense of how many alternatives are available in the marketplace. In line with prior research, we found that users do not have continuance intention if they have alternatives available in the marketplace. However, alternative attractiveness does not exert a significant effect on intention to purchase. Alternative attractiveness affects the continued usage decision but does not seem to affect the purchasing decision. It also had no effect on the relationships between satisfaction and loyalty intentions. Jones et al. [2000] found a significant moderating effect of alternative attractiveness when there are no other moderators. However, Seiders et al. [2005] and Voss et al. [2010] found no effect when there are other moderators. In this study, we had several factors other than the alternative attractiveness and the effect of the alternative attractiveness might be absorbed by the other moderating factors.

According to the results, switching cost had a positive effect on continuance intention and intention to purchase. Switching cost is high for those who are familiar with a software application or who have substantial data stored in the application's server. The switching cost that outweighs the perceived benefit of switching to an alternative motivates users to continue to use the same application and purchase additional features. As switching cost increases, the relationship between satisfaction and continuance intention diminishes. Users continue to use the same application because of a high switching cost even though the usage experience is not satisfactory. On the other hand, switching

cost does not influence the relationship between satisfaction and intention to purchase. Although high switching cost motivates users to remain in a relationship, it does not motivate users to purchase additional features when the usage experience is unsatisfactory.

Relative advantage describes whether premium features have advantages compared to free features of a freemium software application. As hypothesized, relative advantage forms a positive relationship with intention to purchase. As purchasing premium features widens the gap between premium users and free users, intention to pay is enhanced. Recently, some freemium providers decided to reduce the number of features provided to free users because too many free features led users to ignore purchasing premium features [Kumar 2014]. According to the results, the change in the strategy would convert more free users to premium users. As expected, relative advantage had a positive effect on the relationship between satisfaction and intention to purchase. Users who believe a huge gap exists between premium and free versions have a higher intention to purchase when they are satisfied with the software application.

The “value for money” construct literally means whether spending on premium features offers value for the users’ money. As predicted, users’ intention to purchase is enhanced when premium features are worth buying. Compared to recent literature on purchase intention in the context of the mobile environment, which noted value for money as a critical factor affecting purchase intention, our study obtained the same result. In contrast with the proposed hypothesis, value for money had no moderating effect on the relationship between satisfaction and intention to purchase.

7. Conclusions

7.1. Theoretical Implications

In recent decades, user loyalty has been widely examined in the marketing field. However, in the IS field, user loyalty has not been investigated in detail although continuance is thought to be important. As the freemium model prevails in the software industry, the importance of studies on user loyalty is increasing. The use of software, an experience good whose true value is only recognized after consumption, needs dedicated consideration of the usage environment. In this study, we adapted a research framework from Seiders et al. [2005] that contains various characteristics that affect loyalty intention, and can possibly moderate the satisfaction-loyalty relationship. By investigating personal traits, relational characteristics, and the marketplace environment, we extended the understanding of user loyalty in the IS domain. While there are few empirical studies on freemium software, this paper is a guide for subsequent studies.

Among relational characteristics, usage period was often referred as a characteristic accountable for the formation of loyalty intention. Contrary to previous studies, however, a lengthened usage period negatively influenced user’s purchase intention. Instead of recognizing the true value of the product, users adapt to the software being reluctant to make additional spending as usage period lengthens. This result is particularly interesting since it refutes arguments of past studies, which have insisted on the important role of usage period in forming loyalty intention.

Interpersonal relationships among users have not been investigated in the previous studies. Historically, user-to-user interactions occurred only during sports activities or brand community activities [McAlexander et al. 2002; Schouten and McAlexander 1995]. Recently, the appearance of social networking services has enabled extensive user-to-user interactions regardless of user locations. Therefore, the importance of interpersonal relationships among users has increased along with the demand for related studies. Although interpersonal relationship is only one factor, we extended the concept of relational characteristics from the user-to-business to the user-to-user context. The relationships among users are important in explaining user loyalty intention. Some previous studies failed to reveal the effect of the relationship [Cooil et al. 2007], and others have found conflicting results [Bowman and Narayandas 2004; Jones et al. 2000]. At least for freemium software applications, the relationship plays the role of a switching cost that prevents users from switching from the incumbent product. Based on the results of this study, the interpersonal relationship construct can explain loyalty intention in further studies.

While we examined the satisfaction-loyalty associations, we found no direct effect of satisfaction on intention to purchase. Satisfaction does not seem to explain intention to purchase premium features. Some previous studies have also found no significant relationship between satisfaction and loyalty intention [Mittal and Kamakura 2001], and this finding could differ among the intentions. Users consider various aspects before purchase than continuance. Freemium software applications do not require monetary cost to continue use of the free version while additional features require the exchange of money. Possible user behaviors in the freemium software are continuance, intention to purchase, and recommendation to others. Different costs are required for each behavior, and the effects of their precursors can be different. Although all the different behaviors are not examined and compared in this study, we found that different factors have different effects on continuance and purchase intention. Further studies on the user behaviors in freemium software could consider this finding.

Finally, this study empirically demonstrated the “cannibalization effect” of free versions. Some of the practical examples, such as those of the New York Times and Evernote, showed that free offerings could cannibalize the demand for paid features. Economics papers on the freemium model also show an economic model that implies the possibility of cannibalization [Halbheer et al. 2014; Niculescu and Wu 2014]. However, there has been no empirical research examining the effect to the best of our knowledge. Although imperfect, we indirectly demonstrated the effect by investigating relative advantage. Relative advantage had a direct effect on purchase intention and a moderation effect on the relationship between satisfaction and purchase intention. However, the cannibalization effect requires additional study. This study could begin with measuring the values of the free offering and premium features. We expect this would help freemium software companies to determine an optimal strategy for their products.

7.2. Practical Implications

Satisfaction has long been considered a critical factor in explaining user loyalty. Companies set their strategies to increase user satisfaction level with their brands to retain users. We also found that satisfied users maintain their relationships with current companies. However, although satisfaction was confirmed to be an antecedent of continuance intention, we observed that high levels of satisfaction do not necessarily lead to intention to purchase. By providing satisfactory services to users, companies can retain users, but the users may not have an intention to pay for the services. Simply providing a satisfactory experience does not guarantee profitability for providers. Rather than a direct effect on purchase intention, satisfaction from core services interacts with other factors increasing or decreasing the effect of the other variables. For example, satisfaction enhances the positive effect of the relative advantage on purchase intention. An appropriate strategy for a company might be to widen the gap between premium versions and free versions along with providing satisfactory services. If users perceive that there is a significant difference between premium features and free features, the intention to purchase would be enhanced in cases where users are satisfied with their services.

In addition, other factors have direct effects on loyalty intentions. In the continuance model, switching cost and interpersonal relationship hold users and alternatives in the marketplace attract the users. In the purchase intention model, interpersonal relationships among users encourage users to purchase premium features, and well-designed premium features can be the reason for purchases. Considering the results of the study, freemium software companies can modify their strategy according to their situations. If companies seek more users, they can focus on enhancing user satisfaction levels and increasing switching costs while suggesting their superiority over alternatives to users. If they need to convert free users to paid users, rather than focusing on user satisfaction, companies should increase user-to-user interactions and design premium features that offer value for money and are distinguishable from the free features. This result can be useful to companies by identifying some ideas for appropriate strategies.

7.3. Limitations and Future Research

This study relies on self-reported answers by respondents that might contain biases in responses. Other than the survey items for perceived values or feelings, questionnaires on usage period might not be precisely reported since users might not remember the exact usage period of applications. Some participants responded with invalid periods or were confused concerning their actual usage period. In addition, we measured intention to repurchase, which often does not lead to actual behaviors. The actual behaviors of participants may differ from their answers. These problems are unavoidable in survey-based methods. Recently, actual use or purchases are recorded automatically by software providers’ servers. If the actual data can be combined with the survey data from users, researchers can conduct studies that reflect reality and that are more assuring.

We examined the direct and moderating effects of each characteristic while failing to demonstrate several relationships. Although we failed to demonstrate several relationships, we found that the effects of factors are different according to loyalty intentions. Some factors that had effects on continuance had no effect on purchase intention, and the opposite was found in some cases. We investigated various factors affecting loyalty intention and found limitations comparing each model in detail. For further research, comparing loyalty intentions and software categories or focusing on a specific characteristic would give meaningful insights into freemium user behaviors.

The other possible limitation of this study is that only two applications were chosen to represent the whole freemium software. Thus, because this study is conducted using the dataset collected from users of specific applications, those applications might not represent the entire category to which they belong. Including various types of applications can solve this problem. However, the applications have different characteristics and features. Therefore, it is difficult to examine applications from various categories in one study, which requires a sufficient number of studies for each category of applications.

Despite its limitations and unsupported hypotheses, the current study provides new insights into freemium user behaviors. Researchers and service providers focused on user satisfaction with the belief that user satisfaction leads to profitability. However, the current study confirmed that satisfaction does not guarantee profitability. The empirical results enhance the understanding of how satisfaction and use context (user/relational/marketplace characteristics)

affect user loyalty intention. The findings also suggest the directions for further research on the freemium model. By examining the factors in-depth, further studies could extend the understanding of user behaviors in the freemium model.

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Appendix A. Survey Items

Constructs	Items	Loading (Util)	Loading (Hed)	Reference
Satisfaction	I think that I made the correct decision to use (...)	0.859	0.848	Bhattacharjee (2001), Flavian et al. (2006)
	The experience that I have had with (...) has been satisfactory	0.874	0.892	
	I am satisfied with the performance of (...)	0.872	0.856	
	In general, I am satisfied with the service I have received from (...)	0.863	0.882	
Free Mentality	For freemium software/free-to-play games, I think ... software/games should be free	0.863	0.764	Lin et al. (2013)
	providing free service fits into the original purpose of the Internet (to provide free information)	0.894	0.745	
	in general, software vendors should provide free service	0.874	0.921	
Personal Innovativeness	If I heard about a new information technology, I would look for ways to experiment with it.	0.798	0.824	Agarwal and Prasad (1998)
	Among my peers, I am usually the first to try out new information technologies.	0.847	0.876	
	In general, I am hesitant to try out new information technologies.*	-	-	
	I like to experiment with new information technologies.	0.807	0.809	
Usage Period	How long have you used (...) in months?			
Interpersonal Relationship	I feel like there are bonds among users of (...) and myself.	0.862	0.796	Jones et al. (2000)
	I have developed personal friendships with people using (...).	0.908	0.845	
	I have somewhat of personal relationships with people using (...).	0.881	0.850	
	I am friends with users of (...).	0.840	0.779	
	Users of (...) are familiar with me personally.	0.853	0.812	
Alternative Attractiveness	If I needed to change software/game, there are other good softwares/games to choose.*	-	-	Jones et al. (2000), Sharma and Patterson (2000)
	I would probably be happy with other softwares/games.	0.825	0.772	
	Compared to (...), there are other softwares with which I would probably be equally or more satisfied.	0.918	0.779	
	Compared to (...), there are not very many other softwares with which I could be satisfied.*	-	-	
	I would feel more satisfied with the other softwares/games than (...)	0.784	0.809	
	A new software/game would benefit me more than (...) in achieving my goals	0.643	0.729	
Switching Cost	In general, it would be a hassle to change software/game.	0.832	0.888	Jones et al. (2000)
	It would take a lot of time and effort to change software/game.	0.788	0.896	
	For me, the costs in time, money, and effort to switch software/game are high.	0.852	0.857	
Relative Advantage	Subscribing to paid plans/Using gems enables me to accomplish tasks more quickly than using the basic plan/in the game.	0.902	0.746	Venkatesh et al. (2003)
	Subscribing to paid plans/Using gems improves the quality of the work I do compared to using the basic plan/in the game.	0.917	0.824	
	Subscribing to paid plans/Using gems makes it easier to do my job than using the basic plan/in the game.	0.928	0.792	
	Subscribing to paid plans/Using gems enhances my effectiveness on the job compared to using the basic plan/in the game.	0.944	0.859	
	Subscribing to paid plans/Using gems increases my productivity compared to using the basic plan/in the game.	0.915	0.791	
Value for Money	Paid plans/Gems are reasonably priced	0.895	0.865	Hsu and Lin (2015)
	Paid plans/Gems offer value for money	0.920	0.867	
	Paid plans/Gems are economical	0.907	0.886	
	The quality/Gems of paid plans is good relative to the price	0.887	0.884	
Continuance Intention	I intend to continue using (...) rather than discontinue its use.	0.861	0.905	Bhattacharjee (2001)
	My intentions are to continue using (...) than use any alternatives.	0.891	0.882	
	If I could, I would like to continue using the (...).	0.898	0.889	
Intention to Purchase	I find subscribing to paid plans/purchasing gems to be worthwhile	0.902	0.869	Hsu and Lin (2015)
	I will frequently subscribe to paid plans/purchase gems in the future	0.941	0.902	
	I intend to keep subscribing to paid plans/purchasing gems	0.937	0.930	
	I will strongly recommend others to subscribe to paid plans/purchase gems	0.873	0.890	

Note: *The items were deleted in data examination tests; (...) names of the applications.

Appendix B. Variance Inflation Factors (VIF)

Independent Variables	Dependent Variables	
	Continuance Intention	Intention to Purchase
Satisfaction (SAT)	1.61	1.68
Free Mentality (FM)	1.15	1.20
Innovativeness (INNO)	1.25	1.28
Usage Period (UP)	1.15	1.19
Interpersonal Relationship (IR)	1.18	1.37
Alternative Attractiveness (AA)	1.24	1.27
Switching Cost (SC)	1.15	1.30
Relative Advantage (RA)		1.39
Value for Money (VM)		1.45
FM × SAT	1.35	1.41
INNO × SAT	1.57	1.65
UP × SAT	1.18	1.22
IR × SAT	1.37	1.55
AA × SAT	1.48	1.66
SC × SAT	1.52	1.77
RA × SAT		1.48
VM × SAT		1.90