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THE FREEMIUM (TWO-TIERED) MODEL FOR INDIVIDUAL CLOUD SERVICES: FACTORS BRIDGING THE FREE TIER AND THE PAYING TIER

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ABSTRACT

In this paper, we explore the factors that directly and indirectly affect users' willingness to subscribe to a paid plan for individual cloud services (ICS). This is particularly relevant because the freemium business model of many ICS vendors consists of a free-use phase that precedes users' paid subscription. In effect, these users face two technology acceptance and use decisions. We emphasize the system usage construct and model it as a central, multidimensional construct connecting two stages: the upstream free-use stage and the downstream paid-subscription stage. The responses of 270 actual ICS users indicate that performance and effort related attributes of the ICS as well as uncertainty reduction drive system usage in the free-use stage. However, deep system usage that contributes to users' value perceptions is key to motivate use in the subscription stage. Additionally, we find that the subscribing decision may be significantly constrained by users' free-mentality belief. We highlight and fully discuss the theoretical and practical implications of our study.

Keywords: Freemium, Individual cloud services, System usage, Perceived value, Free-mentality, Willingness to subscribe

The VP of SurveyMonkey says … his company "has never spent a dime on marketing or sales. We had to find a way for usage to drive conversion." (Brent Chudoba 2010 Freemium Summit)

INTRODUCTION

The term *freemium* was first used in 2006 to describe the try-before-you-buy business model. It is now considered the fastest growing online business model and the dominant strategy for launching digital media services [20]. The freemium business model defines how a company delivers value to customers, collects revenues and makes profit [41]. In general, the freemium model is a two-tiered strategy in which a company provides basic services to the customer at no cost while offering premium services for purchase [50]. The objective is to attract new users in the free tier who progress into paying customers of the digital product or service. Thus, freemium goes beyond a *sampling* strategy because it specifically defines a company's structure for product/service, revenue and information flows that benefit all participants.

Despite how companies' freemium strategies may differ (e.g., the extent to which the free service is different from the premium service), it is clear the freemium structure consists of two distinct groups of users

in two different service stages. One group is in the free-use stage generally using an abbreviated version of the product/service and the other group is paying a monthly/yearly subscription fee for premium functionalities. While both free users and paying users contribute to the revenue of digital product/service providers (free users contribute to advertising incomes)[1], the conversion of a free user into a paying customer is a key way for providers to improve overall financial performance [50].

The objective of our study is to expand the research stream involving the freemium strategy for digital businesses. We explore factors that facilitate use in the free tier and in the paid tier of a digital service. Not all free users will upgrade to premium status, which implies that the drivers of use in the free tier differ from those in the paid tier. We suggest the variables influencing customers' adoption decision in each stage are theoretically distinct. For example, theories of *organizational* technology adoption and use that emphasize a technology's performance and effort expectancies (e.g., [47]) are more likely to apply to the free tier when users have no experience with the technology and are evaluating its performance and effort attributes. In contrast, usage (e.g., habit) is an important indicator of use in theories of *consumer* technology adoption (e.g., [48, 49]) and may be more applicable to the paid tier because at this point users have already experienced and evaluated technology performance and effort attributes. Understanding the motivators of use in each stage will clarify *why* users may stay in the free tier. Additionally, we examine factors that are likely to bridge the two tiers and facilitate users' progression from the free tier to the paid tier.

We operationalize our research model in the context of *individual cloud services* (hereinafter ICS). This is because the rise of cloud computing and advances in personal mobile devices have enabled companies to provide a variety of cloud-based individual services that often utilize a freemium business model (e.g., Zoho, Spotify, Grammarly, GoogleDrive) [44]. In this study, we seek to address the following questions: 1) Why do users continue to use the free tier of a cloud service? 2) What motivates users in the free tier toward a willingness to convert to the subscription-based cloud service? Our results underscore the importance of identifying bridging factors that facilitate customer conversions for businesses using the freemium strategy. We provide empirical evidence that *deep use* is an important part of the bridge between the free tier and paid tier. We also explore the role of value perceptions and the effect of the free-mentality attitude in the conversion process.

[1] Typically, conversion rates from the free tier are low (e.g., only 1%-5% for online gaming [40]) and free users are worth only 15% - 25% as much as paying subscribers for most digital businesses [20].

LITERATURE REVIEW

In the context of the freemium business model, existing IS research mainly focuses on identifying factors that may facilitate customers' purchasing or subscribing behavior in a variety of digital market contexts including software vendors of mobile applications, online gaming, and Music-as-a-Service (MaaS), as described in Table 1.

Our study differs from the foregoing studies by constructing a research model in which ICS users' conversion decision is centered upon the system usage construct. We believe this construct is part of the bridge between the free-use stage and paid-subscription stage for several reasons. First, it has already been established that the actual extent (i.e., frequency) of technology use will influence users' perceptions, attitudes, decision-making and behavior toward using the technology [8,9]. Much technology adoption model (TAM) research has corroborated this relationship (e.g., [43]). However, frequency or duration of use may not fully explain why users in the free-use tier would expend resources for access to an ICS they currently use at no cost. We propose that as ICS users experience the free-use phase, factors associated with ICS usage (e.g., depth of use, value) play a bridging role to the second stage of use. As we will discuss in more detail below, it is not merely the frequency/duration of system use that is critical in conversion, but also the extent to which system features/functionalities (depth) are used. For example, one may use Excel at a rudimentary level while others find the intricacies of pivot tables or Solver useful.

Table 1: Freemium Research in the IS Literature

Study	**Context**	**Findings**	**Determinants of Subscribing, Sales, or Purchase Intentions**
Oestreicher-Singer and Zalmanson [30]	Last.fm – online radio and social networking site	Participation in the community influences purchase	Community participation, content organization, content consumption, social influence, and age.
Wagner, Benlian, and Hess [50]	Music-as-a-Service (MaaS)	Functional fit between free and premium tiers increases probability of conversion	Attitude toward the Premium Version
Liu, Au, and Choi [25]	Google Play – Marketplace for Android apps	Review ratings of free-trial app influences sales	Product Visibility – App Ranking Product Quality – App Rating
Roma and Ragaglia [35]	Apple's App Store & Google Play	App revenue is influenced by revenue model (freemium, paid, or free)	Revenue model
Shi, Xia, and Huang [37]	Dragon Nest – massively multiplayer online role-playing game	Formal social groups and informal social connection influence purchase	Social Interactions Usage Experience
Hamari, Hanner and Koivisto [18]	Free-to-play – games	Service quality dimensions influence usage intentions, but not purchase intentions	Perceived Service Quality – assurance, empathy, reliability and responsiveness

THEORETICAL BACKGROUND – SYSTEM USAGE

The system usage construct has received extensive examination in the IS literature, either as an independent or dependent variable. Numerous studies in a variety of contexts have identified and examined an assortment of antecedents and consequences of system usage (see [8, 47] for reviews). However, most of these studies apply only lean measures (e.g., duration and/or frequency) of system usage to describe individuals' intention to use a technology (e.g., [4]). Consequently, researchers have developed more comprehensive definitions of system usage to emphasize complex conceptualizations of user interactions with technologies, as well as context-specific usage (e.g., [6, 7]). For our study, we adopted Burton-Jones and Straub [7]'s framework to define system usage and select appropriate measures.

In accord with this framework, we first characterize ICS system usage as encompassing three elements that include the user, the actual system of use, and a task performed by the user on the system [7]. Thus, in the measurement selection stage we include measures that encompass not only the duration and frequency of system use, but also the use of system features by users to carry out tasks. In effect, we model and measure two distinct facets of system usage to capture both overall usage (frequency and duration) and deep structure usage (use of system features to accomplish tasks).

We propose that a rich conceptualization of system usage for ICS in a freemium business model is important both theoretically and practically. Theoretically, a measure that includes deep structure use would enable us to capture relationships that may not be captured by a lean measure, such as frequency [6, 7]. For example, an individual's frequency of system use is likely to have a different effect on user satisfaction compared to how user satisfaction is influenced by the individual's in-depth use of system features. The user may be satisfied with the navigational aspects of the system that drive usage frequency, but dissatisfied if a specific application does not perform as expected. Additionally, identifying determinants of each aspect of system usage in the free-use stage will reveal the factors that bridge free and paid-subscription ICS use (i.e., motivate conversion). Practically, a research model emphasizing deep structure usage would provide freemium ICS vendors insights regarding how to motivate transition and thereby boost revenue by focusing on the attributes of the technology and the users.

RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

Figure 1 shows our research model which encompasses two stages of system use: the upstream free-use stage and the downstream paid-subscription stage. System

usage in the free-use stage is related to previously identified antecedents in the IS literature: performance expectancy, effort expectancy and service uncertainty. We model system usage and perceived value as the factors that form a bridge to the paid-subscription stage via users' willingness to subscribe. Users' free-mentality attitude moderates the value to willingness relationship.

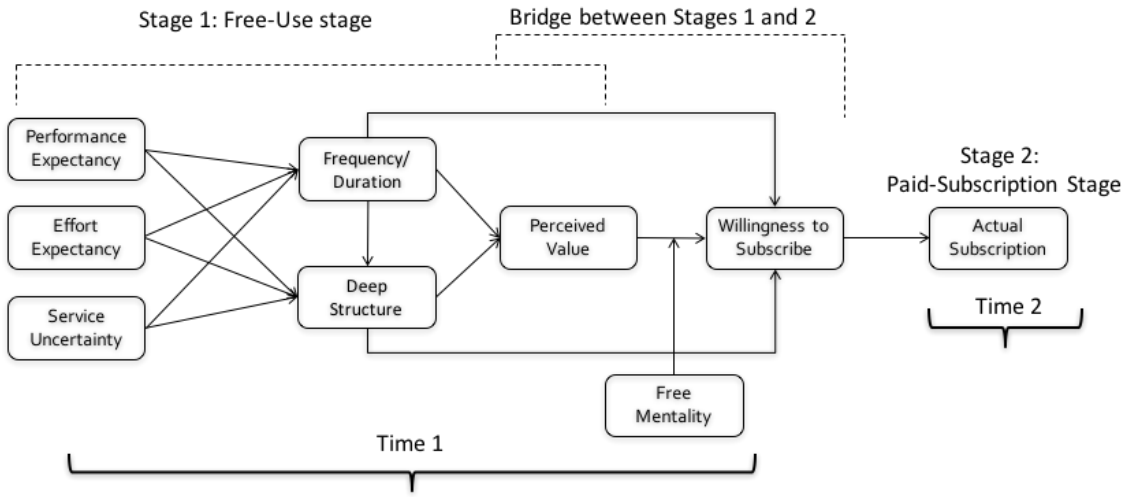

Figure 1: A Two-stage Freemium Model for Individual Cloud Services

Time 1 - Antecedents of ICS System Usage in the Free-Use Stage

Performance Expectancy and Effort Expectancy

In the free-use stage, we propose three constructs as antecedents of system usage: performance expectancy, effort expectancy and service uncertainty. Drawing upon the technology adoption and use theories tailored to consumer contexts (UTAUT2, [48]), performance expectancy and effort expectancy are key constructs positively related to consumers' behavioral intentions to use a technology, which is then theorized to directly influence actual technology use. We expect no different in the free-use stage because users have expectations that the ICS 'provides benefits to consumers in performing certain activities' (i.e., performance expectancy) and there is a "degree of ease associated with consumers' use of technology" (i.e., effort expectancy) [48, p.159].

Because the users in our study are in the free-use stage, they have experienced the technology and will have formed perceptions regarding ICS performance and user effort. These beliefs are salient and will directly influence how the ICS is used, both in frequency of use and depth of use. A technology that meets or exceeds users' performance expectations will be used more frequently and at a greater depth due to benefits that the user realizes during use. Similarly, a technology is likely to be used more frequently and at a greater depth when it is easier to use. Moreover, as users increase usage frequency and duration they are likely to experience the ICS at a greater depth by exploring various functionalities. The above discussion leads to the following hypotheses that predict ICS usage in the free-use stage.

H1a: In the free-use stage, ICS performance is positively related to usage frequency/duration.

H1b: In the free-use stage, ICS performance is positively related to deep usage.

H2a: In the free-use stage, ICS effort is negatively related to usage frequency/duration.

H2b: In the free-use stage, ICS effort is negatively related to deep usage.

H3: In the free-use stage, usage frequency/duration is positively related to deep usage.

Service Uncertainty

We define service uncertainty as users' difficulty in assessing an ICS's performance characteristics (i.e., reliability, accessibility, security) and predicting how the service will operate in the future. We suggest that service uncertainty is a cognitive cost the user must be willing to bear in the decision to use the free-use ICS. If service un-

certainty increases during the free-use due to disruptions, access difficulty or security concerns, then costs become salient and may outweigh net gains resulting in a decline in ICS use.

In the free-use stage, user concerns about the service's security, reliability and availability would be salient and are expected to influence both the frequency and depth of system usage. For example, when cloud storage users perceived a lack of transparency with the vendor and loss of control over their data, they had greater data privacy and security concerns with the cloud vendor [36]. Users are less likely to use the free-use more frequently or explore the full functionality of the ICS (i.e., deep usage) if security risks are perceived or users have experienced unreliable service. Users concerned with the operational aspects of an ICS or the ICS vendor are not likely to fully use the system. Because free-use users are relatively inexperienced with the ICS, it is likely that uncertainty concerns persist and would inhibit system usage, leading to the following hypotheses:

H4a: In the free-use stage, service uncertainty is negatively related to usage frequency/duration.

H4b: In the free-use stage, service uncertainty is negatively related to deep usage.

Factors Bridging Free-Use and Subscription-Based Use

Perceived Value and Willingness to Subscribe

The relationship between the perception of value and purchase intention or behavior has been investigated in both the marketing and IS literature. Value perception is typically defined as "a consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given" [53]. Perceived value can well reflect a consumer's beliefs about quality and expectations about a product/service and thereby predict purchase behavior (e.g., [13]).

In our study, we conceptualize perceived value as a construct that emphasizes the value-for-money dimension. This view is consistent with studies in which perceived value is operationalized as a unidimensional construct highlighting value-for-money (e.g., [42]). The value-for-money dimension is most relevant to the ICS context because free-use users may experience the system at no charge for an unlimited time period and during that time will have formed perceptions regarding other values of the services (e.g., quality, emotional and social value). The monetary value would therefore become salient when the user is confronted with the conversion decision. Consumers rationally evaluate the trade-off between the benefits of a technology or service and the monetary cost of procuring the technology or service. This is also consistent with the findings that price value contributes to positive user attitudes toward paying for premium technology services [50]. Thus, as free users' perception of the benefits from the ICS in the subscription stage outweighs the monetary resources expended, they would tend to be more willing to enter the subscription stage.

On the other hand, it is likely that more extensive use of the ICS (i.e., frequency and depth) will garner higher perceptions of value. This is consistent with many findings in which experiencing the attributes of a product via consumption influences consumers' value perceptions [26]. Because value perceptions form during free-use, it is logical that greater value is attributed to the ICS when it is used more extensively. The above discussion leads to the following hypotheses:

H5: In the free-use stage, usage frequency/duration is positively related to perceived value.

H6: In the free-use stage, deep system use is positively related to perceived value.

H7: In the free-use stage, perceived value is positively related to willingness to subscribe.

System Usage and Willingness to Subscribe

We propose a direct relationship between free ICS usage (i.e., frequency and depth) and users' willingness to subscribe based on the idea of constraint-based acquiescence. Acquiescence is the extent to which one party accepts or adheres to another party's specific requests or policies [29]. For example, a customer who seeks to maintain a business relationship with a vendor is more likely to perform a specified request if s/he believes it is required to maintain the relationship [3].

During the free-use stage, we propose that a constraint-based relationship exists between the ICS provider and the user. Initially, the user enters into the free-use relationship because the benefits of use outweigh the costs of time and cognitive effort to learn and utilize the system. However, over time as the frequency and depth of system use increase, costs decline, and realized benefits increase until the functionality constraints of free-use are reached. For example, free cloud storage services users will eventually reach an allowed maximum storage capacity. Conversion to a paid storage plan may be necessary to maintain the accrued benefits from the free-use as well as continue the vendor relationship. At some point, the ICS user must consider subscription-based use and acquiesce to the conversion request to continue realizing benefits. If no

other option is available, the user is likely to acquiesce. Studies of online services have shown that users who have invested time and effort to learn and utilize a system tend to perceive a lack of alternatives and unfavorable consequences if they lose their relationship with the vendor [19]. In sum, we expect that the extent of free ICS use will positively influence users' willingness to enter into subscription-based use in order to maintain and enhance the benefits from ICS use.

H8: In the free-use stage, frequency/duration of system use is positively related to willingness to subscribe.

H9: In the free-use stage, deep system use is positively related to willingness to subscribe.

Free-Mentality

Free-mentality refers to the phenomenon whereby Internet users believe that all online content should be free [11]. Internet users tend to develop the free-mentality mindset when online content (e.g., news, music, training courses) is provided at no cost by service providers [27]. We suggest that the free-mentality attitude is relevant to the ICS context when the service employs a freemium business model and users believe that a digital service offering a free-use is generating revenue in ways apart from advertising incomes. For example, it has been reported that cloud storage companies may exploit users' cloud data for marketing research purposes as a revenue strategy (e.g., [2]). If users believe subscription-based use is unnecessary for service continuation or the service is profiting from users' personal data and advertising, then free-mentality attitudes are likely to perpetuate and produce unintended effects on the conversion of free users.

While we expect that perceived value will positively influence users' willingness to subscribe, we suggest this relationship will be moderated by the extent to which users hold a free-mentality mindset. Users with higher free-mentality may downgrade the benefits of free-use and their value-for-money perceptions may be constrained by beliefs about how they think the ICS generates revenue. Thus, as perceptions of value form during the free-use, users' free-mentality is likely to suppress the relationship between value perceptions and willingness to subscribe. We therefore suggest that free-mentality is a prevailing user attitude that may explain why greater value perceptions in the free-use may not lead to converting to a paid-subscription.

H10: Users' free mentality will moderate the relationship between perceived value and willingness to subscribe such that the relationship will weaken as users' free-mentality increases.

Time 2 -Willingness to Subscribe and Actual Subscribing

The second stage of the research model depicts the relationship between willingness to subscribe and actual subscribing behavior. Intentions often serve as a proxy for actual behavior because data related to actual behavior may be difficult to acquire, and prior IS research has shown a positive relationship between users' intentions and actual technology use (see [23]). We therefore expect that the individuals' willingness to subscribe will significantly influence their actual subscribing behavior.

H11: Users' willingness to subscribe is positively related to actual subscribing.

METHODOLOGY

Context and Data Collection

As our empirical ICS setting, we selected Spotify – a cloud-based music streaming service that allows users to access its music library via phones, tablets and laptops. With Spotify, a user can choose to listen at no cost or become a paid subscriber to receive premium service. Premium services may include synchronized song lyrics, offline mobile device streaming, extra social media functions and ad-free music. Launched in 2008 in Sweden, Spotify reported over 100 million active users worldwide by January 2016 [38]. In the United States, about 15% of smartphone users currently use Spotify as their music application [38].

Given the wide adoption of Spotify, we used an online crowdsourcing market, Amazon's Mechanical Turk (MT), to collect our data. MT has gained greater popularity as a source for data collection in the IS field [39]. On a compensation basis, researchers are able to access a scalable and on-demand group of individuals who are qualified for participation in various research projects. We only allowed individuals located in the U.S. to access our online questionnaire because U.S.–based MT samples provide demographics very similar to consumer panels and student samples compared to non-U.S.-based MT samples [5, 39], as well as similar reliability, convergent and divergent validity among the measurement items [39].

Our online questionnaire contained two parts: a qualifying test and a survey. The qualifying test contained five multiple-choice questions (see Appendix) with the objective to screen out individuals who are not Spotify

users or who are not currently using the free version. In other words, only individuals in the free-use stage of Spotify were deemed qualified to complete the survey. A total of 833 individuals accessed our online questionnaire during a one-week period. Among them, 511 individuals did not pass the qualifying test (i.e., did not answer all five pre-test questions correctly). Of the remaining 322 free Spotify users who completed the survey, 52 of those responses were discarded because the respondent failed to correctly answer two attention check questions in the survey. As a result of the above process, a total of 270 complete and usable responses were obtained for subsequent data analysis.

Because our research model represents two stages of ICS use, we collected our data in two time periods. In the first time period (March, 2016), we targeted users in the free-use stage and collected data regarding their willingness to become paid-subscribers. Six months[2] later in the second time period, we contacted the same 270 respondents and asked about their actual subscription status. One challenge of reaching these respondents is that MT does not provide tools to contact workers once the project has expired. Therefore, we wrote a script in R using the "MTurkR" package [22] which allowed us to broadcast a message to all the respondents using their worker IDs. We offered bonus rewards in the message to motivate responses. Of the 270 messages sent out, 122 responded to the question "Are you currently using a free or premium Spotify account?" Table 2 summarizes the demographic data of the 270 respondents.

Measurement

We used well-established scales to measure the constructs in our research model. First, a pre-test of the survey was conducted using the responses of 86 undergraduate students to assess the adaptations of the measurement items to the Spotify context. The pre-test resulted in further refining the measurement items related to effort expectancy and system usage for our particular context. A total of 8 multiple-item scales were adapted for our study and Appendix details the scales used in the MT online questionnaire. Except for system usage, all items were measured reflectively using a 7-point Likert scale anchored by Strongly Disagree and Strongly Agree. The system usage construct was measured in two ways. It was measured formatively using relatively lean measures – frequency and duration of use [45] to obtain a sense of overall ICS use. Then we added a reflective measurement called deep structure usage to capture the use of system features for specific tasks [7].

Table 2: Demographic Characteristics of the Respondents (N=270)

Gender	Male = 129 (47.8%); Female = 141(52.2%)
Age	18~24 = 87 (32.2%); 25~34 = 135 (50.0%); 35~44 = 37 (13.6%); 45~54 = 5 (1.9%); 55~64 = 5 (1.9%); 65 and over = 1 (0.4%)
Income	<$25,000 = 85 (31.5%); $25,001~$49,999 = 107 (39.5%); $50,000~$74,999 = 57 (21.1%); $75,000~$99,999 = 15 (5.6%); $100,000~$149,999 = 5 (1.9%); >$150,000 = 1 (0.4%)
Education	Less than High School = 1 (0.4%); High School/GED = 28 (10.4%); Some College = 64 (23.7%); 2-year College Degree = 24 (8.9%); 4-year College Degree = 117 (43.3%); Masters Degree = 30 (11.1%); Doctoral Degree = 2 (0.7%); Professional Degree (JD, MD) = 4 (1.5%)
Internet use	No time spent = 0 (0.0%); <10 min/per week = 0 (0.0%); 10 min~1 h/per week = 1 (0.4%); 1 h~5 h/per week = 18 (6.7%); 5 h~10 h/per week = 98 (36.3%); >10 h/per week = 153 (56.6%)

Data Analysis and Results

Partial Least Squares (PLS) methodology was applied to test our research model given that formative constructs that are not well supported in CB-SEM [10]. We conducted a 5,000 bootstrap sampling approach to assess the reliability, convergent validity and discriminant validity of the measurement model. The results in Table 3 show composite reliability (CR) above the 0.7 threshold value and average variance extracted (AVE) values for all constructs are above the 0.5 threshold, indicating good reliability [14]. We relied on factor loadings and the square root of the AVE for each construct to evaluate convergent and discriminant validity [17]. The square root of the AVE in bold on the diagonal, as shown in Table 3, is well above the construct correlations in both rows and columns, supporting the discriminant validity of the constructs [14]. Furthermore, as shown in Table 4 below, all constructs' related items load greater than the 0.7 threshold value with low cross-loadings on unrelated constructs, demonstrating convergent and discriminant validity [14].

[2] During the six-month time lapse the Spotify Premium offerings remained the same.

Table 3: Reliability, Validity and Correlation Matrix

Construct	Mean	SD	CR	AVE	EE	FM	PE	PV	SA	SU	USAGE	WTS
EE	4.17	1.56	0.97	0.92	**0.95**							
FM	4.61	1.81	0.88	0.72	-0.01	**0.84**						
PE	5.65	1.16	0.92	0.80	0.34	-0.08	**0.89**					
PV	4.26	1.61	0.94	0.86	0.36	-0.28	0.40	**0.92**				
SA	5.02	1.16	0.97	0.91	0.20	-0.04	0.58	0.27	**0.95**			
SU	4.76	1.64	0.95	0.87	-0.14	-0.24	0.17	-0.03	0.13	**0.93**		
USAGE	3.90	1.98	0.86	0.68	0.37	0.01	0.28	0.22	0.20	-0.26	**0.82**	
WTS	3.75	1.86	0.98	0.97	0.42	-0.19	0.47	0.64	0.22	-0.07	0.39	**0.98**
EE: Effort expectancy; FM: Free mentality; PE: Performance expectancy; PV: Perceived Value; SA: Satisfaction; SU: Service uncertainty; USAGE: System usage; WTS: Willingness to subscribe												

Table 4: PLS Factor Loadings and Cross Loadings

	EE	FM	PE	PV	SA	SU	USAGE	WTS
EE1	**0.953**	0.035	0.340	0.319	0.241	-0.134	0.354	0.399
EE2	**0.974**	-0.045	0.325	0.368	0.204	-0.144	0.377	0.418
EE3	**0.954**	-0.003	0.329	0.353	0.131	-0.145	0.351	0.420
FM1	-0.046	**0.818**	0.011	-0.231	0.033	-0.125	-0.038	-0.148
FM2	0.030	**0.860**	-0.129	-0.251	-0.075	-0.243	0.004	-0.188
FM3	-0.008	**0.878**	-0.078	-0.233	-0.052	-0.239	0.072	-0.151
PE1	0.357	-0.069	**0.919**	0.435	0.600	0.088	0.312	0.477
PE2	0.313	-0.073	**0.917**	0.329	0.482	0.203	0.257	0.420
PE3	0.232	-0.088	**0.860**	0.298	0.464	0.213	0.182	0.362
PV1	0.309	-0.261	0.398	**0.928**	0.293	-0.005	0.166	0.590
PV2	0.368	-0.239	0.393	**0.952**	0.243	-0.032	0.228	0.643
PV3	0.325	-0.284	0.333	**0.902**	0.224	-0.065	0.224	0.567
SA1	0.178	-0.020	0.521	0.244	**0.955**	0.129	0.179	0.207
SA2	0.212	-0.050	0.570	0.273	**0.964**	0.109	0.204	0.234
SA3	0.184	-0.048	0.582	0.265	**0.956**	0.139	0.203	0.216
SU1	-0.140	-0.244	0.150	-0.051	0.087	**0.936**	-0.235	-0.068
SU2	-0.155	-0.238	0.150	-0.060	0.144	**0.935**	-0.229	-0.078
SU3	-0.120	-0.200	0.187	0.004	0.136	**0.938**	-0.267	-0.054
USAGE3	0.219	0.064	0.198	0.109	0.164	-0.173	**0.788**	0.252
USAGE4	0.360	0.088	0.234	0.174	0.179	-0.310	**0.859**	0.354
USAGE5	0.331	-0.103	0.280	0.251	0.167	-0.155	**0.842**	0.366
WTS1	0.426	-0.179	0.473	0.646	0.240	-0.071	0.405	**0.988**
WTS2	0.423	-0.200	0.466	0.634	0.212	-0.068	0.382	**0.987**

For the system usage construct, the contribution of the formative elements (frequency and duration) to the construct was assessed separately. The t-value results in Table 5 show that each indicator contributes significantly to the system usage construct which supports the validity of the formative measures [51]. In addition, variance inflation factor (VIF) values were calculated and are below the threshold value of 3.33, demonstrating relatively little multicollinearity [32].

Table 5: Weights of Formative Measures (*** Sig. at p < 0.001)

Construct	Dimension	Mean	SD	Weight	t-value	VIF
System Usage	Frequency	4.57	1.46	0.52	5.09***	2.236
	Duration	4.01	1.44	0.56	5.59***	2.236

Finally, we applied a common method factor test to measure the degree of common method variance in our results [33]. We loaded all the items on a common-method construct as well as eight major latent constructs. Our results indicate that about 92% of the item variance was explained by the measurement errors and model constructs. In contrast, only 8% of the model variance was explained by the common-method construct. This suggests that the common method variance can be safely ignored [24].

Structural model

Because two time periods are depicted in our research model, we evaluated Hypotheses H1-H10 prior to testing H11 concerning the relationship between the respondents' willingness to subscribe and their actual subscribing behavior. Due to missing data in our sample for testing H11, we applied the missing value algorithm (case wise replacement) in PLS. We also tested H11 without the missing value cases and the results are highly consistent.

Table 6 summarizes the results and tests of hypotheses. H1 and H2 are supported showing significant positive relationships between performance expectancy and system usage (both usage frequency/duration and deep usage) (H1a: $\beta = 0.601$, $p < 0.001$; H1b: $\beta = 0.196$, $p < 0.01$) and effort expectancy and system usage (H2a: $\beta = 0.154$, $p < 0.01$; H2b: $\beta = 0.210$, $p < 0.001$), with a significant path between usage frequency/duration and deep usage (H3: $\beta = 0.171$, $p < 0.05$). The relationship between service uncertainty and system usage is significant as well (H4a: $\beta = -0.105$, $p < 0.05$; H4b: $\beta = -0.265$, $p < 0.001$). Both usage frequency/duration and deep usage are found to significantly influence perceived value (H5: $\beta = 0.287$, $p < 0.001$; H6: $\beta = 0.164$, $p < 0.05$) as well as willingness to subscribe (H8: $\beta = 0.349$, $p < 0.001$; H9: $\beta = 0.151$, $p < 0.01$). H7 is supported in that perceived value is significantly related to willingness to subscribe ($\beta = 0.487$, $p< 0.001$). The moderating effect of free-mentality on the relationship between users' value perceptions and willingness to subscribe is supported (H10: $\beta = -0.354$, $p< 0.05$). Finally, users' intention to subscribe to a paid ICS will positively predict their actual subscription behavior (H11; $\beta=0.361$, $p< 0.001$). Overall, the model explains about 54.5% of the variance in users' willingness to subscribe to an ICS paid plan and about 13.0% of variance in actual subscription behavior.

DISCUSSION AND IMPLICATIONS

In an effort to answer the call of researchers for cross-context theorizing based on the model of technology acceptance and use [49], our study contributes to IS research by expanding the model into current consumer technology contexts that employ two stages of use. The freemium business model represents a unique framework in which to explore user motivations in two distinct phases of technology use. Our research model attempts to show the decision processes of users as they contemplate transitioning from the free-use stage to the paid subscription stage, with a specific focus on the system usage construct as a critical component of the process.

Free-Use Stage

In the free-use stage, we found that users benefit from better performance on specific tasks that are not hindered by undue effort to learn or navigate the ICS. The ICS vendor benefits because as gains are accrued by users, the more likely the frequency, duration and depth of free ICS use increases. Increasing the scope of free-use system usage is crucial because it is fundamental to users' subscribing decisions. The implication is that meeting users' expectations via system performance and effort is an effective way to motivate the fullness of use (frequency and depth) of the free-use ICS. On the other hand, free users require assurances regarding the reliability, accessibility and security of the ICS. Without these assurances, users are less likely to increase the scope ICS use, which ultimately influences subscribing behavior.

Table 6: Results of PLS Analysis (* p < 0.05; ** p < 0.01; *** p < 0.001)

Time 1 - Hypotheses	**Coefficient**	**t-Value**
H1a: Performance Expectancy → Usage (Freq/Dur)	0.601	12.981***
H1b: Performance Expectancy → Usage (Deep)	0.196	2.794**
H2a: Effort Expectancy → Usage (Freq/Dur)	0.154	2.903**
H2b: Effort Expectancy → Usage (Deep)	0.210	3.575***
H3: Usage (Freq/Dur) → Usage (Deep)	0.171	2.350*
H4a: Service Uncertainty → Usage (Freq/Dur)	-0.105	2.117*
H4b: Service Uncertainty → Usage (Deep)	-0.265	4.892***
H5: Usage (Freq/Dur) → Perceived Value	0.287	4.377***
H6: Usage (Deep) → Perceived Value	0.164	2.298*
H7: Perceived Value → Willingness to Subscribe	0.487	9.201***
H8: Usage (Freq/Dur) → Willingness to Subscribe	0.349	6.684***
H9: Usage (Deep) → Willingness to Subscribe	0.151	2.974**
H10: Perceived Value * Free-Mentality	-0.354	2.039*
Control Variables	**Coefficient**	**t-Value**
Satisfaction → Willingness to Subscribe	0.017	1.485
Age → Willingness to Subscribe	-0.088	1.380
Gender → Willingness to Subscribe	-0.020	0.216
Income → Willingness to Subscribe	-0.014	0.653
Internet → Willingness to Subscribe	0.029	0.932
Education → Willingness to Subscribe	-0.006	0.258
Variance Explained (R^2)		
Willingness to Subscribe: R^2 = 54.5%		
Usage (frequency & duration): R^2 = 43.6%		
Usage (deep structure): R^2 = 27.5%		
Perceived Value: R^2 = 14.5%		
Time 2 - Hypothesis	**Coefficient**	**t-Value**
H11: Willingness to Subscribe → Subscribing	0.361	6.551***
Subscribing: R^2 = 13.0%		

Our research model takes IT acceptance and use a step further than prior studies because users face a unique decision in the freemium business model. Users must assess monetary value in order to make a cost-benefit determination that influences a second technology use decision – actual subscribing. We suggest that users' perceptions of value are most salient during the free-use stage when the user is actually experiencing and realizing the benefits of the ICS. Thus, it is not surprising that users attribute greater value to the ICS as their frequency, duration and depth of use increases. It is likely that value perceptions increase with use because users are accruing benefits and gains that outweigh the opportunity costs of using another system or doing something else. Thus, boosting the perception of value would be important for the conversion of free users to subscribers. Free users must believe that the resources they would expend for a subscription are less than the advantages they would lose if the ICS terminates.

Paid-Subscription Stage

Why is the free-use stage so important to the freemium business model? Our study indicates that it leads to a fullness of use (frequency, duration and depth) that exerts a positive direct effect on subscribing and also magnifies the value of the ICS. Greater value, in turn, leads to user acceptance and use of the technology in the subscription phase. Rational users will not expend monetary resources if they perceive they will not be better off by doing so.

An interesting part of the conversion process is the effect of users' beliefs about Internet content and services on their willingness to subscribe. As expected, the free-mentality mindset is a significant moderator in the

decision process; it appears to hinder the relationship between users' perceptions of value and their willingness to subscribe. That is, the free-mentality belief tends to exert negative pressure on this relationship. Those with a stronger belief that all things Internet-based should be free are not as motivated to subscribe by the positive value aspects of the ICS, compared to users with a weaker free-mentality. Vendors of ICS would benefit by challenging the free-mentality mindset in order for value perceptions to drive subscribing behavior more effectively.

Overall, the freemium consumer model for technology purchases is a technology acceptance and use process that differs from previous organizational or individual consumer contexts where IT products or services are either free or paid to use [52]. In organizational contexts where IT is free for employees to use, users' IT acceptance and use hinges on factors such as performance and effort expectancy [47]. In consumer contexts where IT is typically purchased prior to use, individuals' IT acceptance and use is largely determined by price value [48]. Our study expands IT acceptance models to include freemium business processes in which system usage is a key construct in a conversion process that hinges on the value perceptions of users who have experienced the system. We show that the system usage and perceived value constructs connect the two stages (free-use and subscription). The free-use phase is similar to the organizational context where IT is free to use, and a subscription stage is analogous to the consumer context in which IT use has a monetary cost [52]. As more and more individual services are moving to the cloud, companies are employing the freemium business model as a strategy to boost revenues [12, 34]. Hence, the present study advances the conceptualization of IT acceptance and use in these emerging contexts.

LIMITATIONS AND CONCLUSION

Our study has several limitations that may affect the broad application of our research model. First, the respondents of this study are all located in the United States. While limiting the responses to U.S.-based samples provides better data reliability and validity, it reduces the generalizability to other nations and/or cultures. Second, while we conceptualize system usage in terms of both overall and deep structure usage, our model may neglect other facets of use that would significantly influence subscribing behavior. For example, different users spend different amount of time and effort in learning to use the service or navigating the system, which may result in distinct perceptions toward the ICS in the free-use stage. Thus, future researchers could extend our study by including other sub-constructs such as cognitive absorption [1] to explain potential effects resulting from other facets of system use. Third, our study relies on self-reported, cross-sectional data that may contribute to common method bias (CMB). While we have shown that CMB is not a substantive issue in our model, readers should take method variance into account when applying our results in other contexts.

Consumers' technology acceptance and use behavior is evolving as companies, such as ICS vendors, promote new business models. A free-use phase of use prior to securing a fee-for-service relationship with a cloud vendor is a recent trend that expands the meaning of technology acceptance and use. We show that the factors driving free use differ from those that drive subscribing behavior. Traditional IT acceptance models fall short in clarifying how users in the freemium model are motivated to make the transition. Given the wide adoption and use of ICS, we hope that future research will draw upon our findings and further explore the nature of technology use for companies that employ a freemium business model.

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APPENDIX – ONLINE QUESTIONNAIRE

Part 1: Qualifying Test (multiple choice)
1. Please indicate whether you have a Spotify Music account (https://www.spotify.com/us/)
a) Yes, I have a Spotify Music account b) No, I don't have a Spotify Music account
2. Please indicate whether you currently use a Free Spotify Music account (i.e., you don't have a Premium account)
a) Yes, I am a Free account user b) No, I am a Spotify Premium account user
3. Which vendor below provides the free lyrics service in Spotify?
a) AZLyrics b) MetroLyrics c) Musixmatch Lyrics d) Lyrics Mania
4. Which feature below is NOT available in Spotify?
a) Listen to radio b) Create playlists c) Import local music into Spotify d) Access to Facebook e) All are in Spotify
5. How much is the current subscription fee to Spotify Premium?
a) $5.99/month b) $9.99/month c) $14.99/month d) $19.99/month
Part 2: Survey
1. Satisfaction [19, 21]
SA1: I am content with Spotify Music service.
SA2: I am pleased with Spotify Music service.
SA3: Overall, I am satisfied with Spotify Music service.
2. Effort Expectancy [48]
EE1. Learning how to use Spotify Music is easy for me.
EE2. My interaction with Spotify Music is clear and understandable.
EE3. I find Spotify Music easy to use.
3. Free Mentality [11]
FM1: Internet content should be free.
FM2: I would not pay for Internet content.
FM3: Everything on the Internet should be free.
4. Service Uncertainty (Adapted from [31])
SU1: I feel that using Spotify involves a high degree of uncertainty related to service security, reliability and availability.
SU2: Regarding the Spotify service, I feel that the uncertainty associated with service security, reliability and availability is high.

SU3: If I use Spotify Music, I am exposed to many uncertainties, such as service security, reliability and availability.

5. Perceived Value [16]

PV1: I think the paid plans of Spotify Music service offer value for the money.

PV2: I think the paid plan of Spotify Music service would meet my needs at a reasonable price.

PV3: Spotify Music's paid plans are economical.

6. Performance Expectancy (Adapted from [48])

PE1. I find Spotify Music useful in my daily life.

PE2. Using Spotify Music helps me find and access music I like more quickly.

PE3. Using Spotify Music is very entertaining.

7. Willingness to Subscribe [46]

WTS1: I intend to subscribe to a paid plan of Spotify Music service in the future.

WTS2: I predict that I would subscribe to a paid plan of Spotify Music service in the future.

8. System Usage [7, 45]

- *Frequency and duration (formative)*

USAGE1: How frequently do you use Spotify? (1~7: "not at all" to "many times a day")

USAGE2: On average, how many hours every week do you use Spotify? (1~7: "0~1" to "over 100")

- *Deep structure usage (reflective)*

USAGE3: When I use Spotify Music, I use features that help me access and manage the song lyrics.

USAGE4: When I use Spotify Music, I use features that help me post the songs I was listening to on the Spotify community or social networking sites (e.g., Facebook, Twitter).

USAGE5: When I use Spotify Music, I use features that help me import, play and manage my local songs.