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RESEARCH PAPER

How to Succeed with Cloud Services?

A Dedication-Constraint Model of Cloud Success

Manuel Trenz · Jan Huntgeburth · Daniel Veit

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Abstract How can cloud providers be successful? Severe competition and low up-front commitments create enormous challenges for providers of consumer cloud services when attempting to develop a sustainable market position. Emergent trends like consumerization lead to high growth rates and extend the reach of these services far into the enterprise sphere. Using a freemium model, many providers focus on establishing a large customer base quickly but fail to generate revenue streams in the long run. Others charge consumers early but do not reach their growth targets. Based on a representative sample of 596 actual cloud service users, the study examines how consumer cloud services can become self-sustainable on the basis of the user base and revenue streams they generate. The authors identify two mechanisms that influence the success of consumer cloud services, dedication- and constraint-based mechanisms, and show how they drive different elements of success. They find that satisfaction impacts the success of cloud services in terms of user generation and continuance, while switching barriers need to be in place to generate revenues. The results indicate that focusing on a single success element can be misleading and insufficient to understand the success of cloud services. The key findings are used to derive recommendations for three generic strategies that cloud providers can apply to become successful in their competitive market environment.

Keywords Cloud computing · Digital services · Business model · Willingness to pay · Upgrade · Freemium · Success factors · Cloud service

1 Introduction

Consumer cloud services see a large momentum. With continuous double-digit growth rates and a projection of 3.6 billion consumers using cloud services worldwide in 2018 (eMarketer 2014), cloud services become an elementary part of our everyday lives. At the same time, revenues of public cloud services are expected to double until 2019 (IDC 2016). The primary use case for consumer cloud services is the private environment of end-users. Services such as Dropbox, Office 365, or Spotify allow individuals to access data or tools from anywhere and to interact with others via shared resources. These cloud services, which would otherwise require considerable financial resources or technological know-how, enable individuals to exploit advanced technology with only little effort and investment. Being accustomed to these consumer services, individuals frequently introduce them into their work environment (Harris et al. 2012), and the importance of consumer cloud services extends beyond personal use of individuals (Baskerville 2011). However, as we discuss in the following, the characteristics of consumer cloud services and the frequently applied freemium model create unique challenges to their success.

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Dr. M. Trenz (✉) · Dr. J. Huntgeburth · Prof. Dr. D. Veit
University of Augsburg, Universitaetsstrasse 16,
86135 Augsburg, Germany
e-mail: manuel.trenz@wiwi.uni-augsburg.de

Dr. J. Huntgeburth
e-mail: huntgeburth@is-augsburg.de

Prof. Dr. D. Veit
e-mail: daniel.veit@wiwi.uni-augsburg.de

As this new class of digital services is characterized by low up-front commitment and dynamic adjustment of the required service level (Armbrust et al. 2010), the consumer cloud service market is highly competitive and providers face enormous challenges in positioning their services (Rossbach and Welz 2011). Effective business models in markets for digital products are hard to determine (Veit et al. 2014). Cloud providers often make a choice between growing fast and generating revenue flows. In contrast to enterprise services, many providers focus on establishing a large customer base quickly. In the long run, however, these services often lack a strategy to generate sufficient revenue streams (Needleman and Loten 2012). More often than not, the transformation of free users into paying consumers fails (Kim and Son 2009). Experts estimate that – on average – only 2% of the users pay for freemium-based cloud services (Needleman and Loten 2012). Other service providers charge users immediately or after a trial phase, but do not manage to generate enough growth. As a result, it remains unclear how the business model behind cloud services should be designed and which goals cloud services should pursue in order to become successful since the interdependencies between different success factors are largely underinvestigated.

Success factors are defined as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization" (Rockart 1979). While earlier studies have revealed the plenitude of success factors for cloud providers (Labes et al. 2017), we focus on success factors that relate to the providers' relationship with the consumer and investigate how those success factors can be realized. A cloud service can only be successful in the long run if it manages to achieve two goals simultaneously: (1) building and retaining a considerable user base, and (2) generating sufficient revenue streams. In this article, we address theoretically and empirically how and why cloud services become self-sustainable on the basis of the user base and revenues they generate. Building upon a dedication-constraint perspective, we analyze how different characteristics of the cloud-service relationship influence these market-oriented success factors. We characterize two mechanisms that influence success either in terms of the user-base or in terms of the revenue streams. We thereby try to nudge research away from focusing solely on one element of success towards a view that depicts the multi-dimensional nature of cloud service success.

The remaining parts of the paper are structured as follows. In the next section, we review existing literature on the freemium model, service relationships and success. We use these insights to develop a dedication-constraint model of cloud success. Section three introduces our survey research methodology followed by a presentation of the results in section four. Finally, section five highlights our key findings and discusses implications for theory and practice.

2 Cloud Service Success

Cloud computing can be seen as an evolution of IT service provisioning with respect to both the underlying technology and the business models for delivering IT-based solutions (Iyer and Henderson 2010; Venters and Whitley 2012). We define cloud computing as a virtualization-based style of computing where IT resources are offered in a highly scalable way as a cloud service over the internet (Armbrust et al. 2010). In our study we focus on consumer cloud services, i.e., applications running on cloud infrastructure which is completely managed and controlled by the provider (Benlian et al. 2011), and where users share common technical infrastructure and their control over data, network and security is limited (Zhang et al. 2010). These cloud services are typically accessed through a web browser or a thin client instead of being deployed on the consumer's device. All digital services create a dependence between user and provider due to the perceived benefits that a user receives from the provider (dedication-based relationship mechanism). Consumer cloud services are a specific subset of digital services because they involve storing and sharing personal data among consumers. Thus, cloud services create dependence on the relationship partner, because ending the relationship is costly (constraint-based relationship mechanism). For consumer cloud services, switching involves transferring personal data to a different cloud provider. Moreover, switching costs can be reflected in the lost benefit of sharing information with other users of the same service. Given that in particular consumer cloud services exhibit these special characteristics of digital services (i.e., dedication- and constrained-based relationship mechanisms), we believe that consumer cloud services best describe the boundary conditions of our study.

2.1 The Freemium Model

The most common revenue model for consumer cloud services is the freemium model. Services applying the freemium model typically distinguish a free and a premium version that entails advanced functionality, additional features, resources, or less disturbance (Teece 2010; Liu et al. 2014). Thereby, free features can serve as an advertising tool (Kumar 2014). Freemium services are typically characterized by high fixed costs and low marginal costs for new users such that few premium users subsidize a large number of free users. In the case of cloud services, fixed

costs include the development and management of the services while limited infrastructure resources are required to accommodate an additional consumer.

Within recent years, the freemium model has gained enormous popularity and has also been adopted by a variety of apps (Liu et al. 2014), music services (Wagner et al. 2014), games (Hamari et al. 2017), or news platforms (Niculescu and Wu 2014). In this context, a series of studies have investigated the question how users of the free version of a service can be converted into paying premium users. Suggested solutions include introducing limitations to the free service (Wagner et al. 2014), offering a high-quality free version (Liu et al. 2014), fostering interactions within the service (Shi et al. 2015), or introducing trials for the premium version (Koch and Benlian 2016). However, cloud markets are characterized by the effect that the best providers capture a significantly large share of the rewards with remaining competitors being left with little. In these types of markets, creating willingness to pay for the premium service is only one part of the puzzle. Cloud providers at the same time have to create a large user base quickly. Accordingly, they have to balance two often divergent goals: building and retaining a large customer base and skimming customers' willingness to pay.

2.2 Elements of Cloud Service Success

We started with a comprehensive literature overview on customer-related outcomes to identify the key consumer-related elements that determine the success of a cloud service with regards to both user base and revenue streams. The initial list was screened for factors that are either not applicable to cloud services or they have no influence on the services' ability to build a customer base or generate revenues. The former applied to repurchasing intentions and complaining behaviors (Johnson et al. 1995; Szymanski and Henard 2001; Gustafsson and Johnson 2004; Luo and Homburg 2007). As a result, we identified five consumer-related success factors: loyalty, continuance intention, shared word-of-mouth (WOM), willingness to pay for retention (WTP) and willingness to upgrade (WTU). Based on this list, we conducted an extensive, cross-disciplinary literature review (Webster and Watson 2002) to establish a detailed overview of the studied relationships, contexts, examination objects and the domains of the previously specified success elements. This review highlights that the network of interrelationships between indicators is unexplored as most studies focus on one or two of these success elements. Further, we make use of these insights to inform our hypothesis building and to discuss our findings in the light of previous research. In the following, loyalty, continuance intention, WOM, WTP and WTU are clearly defined and their commercial desirability is highlighted.

The five elements can be classified to influence success into three ways. First, they can determine growth and stability of the user base (WOM, continuance intention). Second, they can influence the possibilities to generate revenue streams (WTP, WTU). Lastly, success can be indirectly influenced by shaping the relationship between the provider and the user (loyalty), but relationships are difficult to influence for cloud services that are characterized by very little points of contact with the customer (Lansing and Sunyaev 2016). Thus, we control for the effects of loyalty, but treat it as a secondary success element for cloud services.

Continuance intention is defined as an individuals' intention to remain a user of the cloud service. Continuance is a central construct in IS research (Bhattacherjee 2001) and an important indicator for a cloud service's ability to retain the current customer base. Also cloud practice suggests that cloud providers need to become better at holding on to customers, since the "payoff takes longer – and because it is easier for customers to switch providers" (Bain 2012). WOM is a "dominant force in the marketplace" (Mangold et al. 1999) and an "effective mean to increase the revenues and profits of firms" (Kim and Son 2009). The growing presence of the internet is even expanding its importance for the market success of IT services (Brown et al. 2005). Compared to traditional software products, cloud services are often promoted by a "word-of-mouth model" (Deloitte 2009). WOM refers to "informal communication between private parties concerning evaluations of goods and services" (Anderson 1998), which can be either positive, neutral, or negative. The additional benefit of an increasing customer base for the individual user resides in improved opportunities of file sharing or – in some cases – the earning of more storage. In line with previous research, we use positive WOM behavior – referring to the customer intention to spread favorable information about the service provider and its service among peers (Maxham and Netemeyer 2003) – as a proxy for estimating the potential increase of the customer base. Regardless of the channel through which WOM activities are distributed, it influences how easy and effective the network externalities inhibited in cloud services can be exploited by the cloud provider.

Customer's willingness to pay (WTP) is very valuable information necessary to formulate a business strategy. Therefore, the challenge of its determination has long been in focus of research and practice (Miller et al. 2011). For cloud providers using a freemium revenue model, this question is even more important since they depend on customers who upgrade their service. An investigation of previous studies on revenue streams revealed that these studies have addressed different benefits for which customers could be charged. Vock et al. (2013) investigate

willingness to pay for advanced features or additional purchases. Such willingness to pay for an upgrade (WPU) has accordingly been defined as a customer's willingness to pay a small fee for advanced features of a service currently available for free (Vock et al. 2013). However, a second possibility to generate financial earnings is often either ignored or used synonymously: the willingness to pay for retention, defined as the willingness to pay for the same service currently available for free (Kim and Son 2009). In the former case, the user has increased requirements and pays for additional features or functionality. In the latter case, the service introduces a price tag for a service that was free of charge beforehand. Our literature review revealed that no past study has investigated both revenue sources simultaneously. In the context of cloud services, we argue that it is necessary to distinguish these two types of willingness to pay carefully, because they depict two different paths to financial success. We differentiate these two types of revenue streams in our study. Both elements determine how well current customers using the free version can be converted into paying customers, who actually generate revenues.

Customer loyalty is a customer's or user's overall attachment or deep commitment to a product, service, brand, or organization (Oliver 1999). Transferring this conceptualization to the context of cloud services, we define loyalty as a customer's affective commitment to the cloud service of a given provider. Although loyalty has no direct impact on the user base or the revenues, a strong affective commitment to the service will also influence the intention to continue using it. Furthermore, loyalty has been shown to be a powerful driver of word-of-mouth (e.g., Brown et al. 2005), willingness to pay for an existing service (e.g., Zhang and Bloemer 2008) or general willingness to pay (Eisingerich et al. 2013), for instance for an upgrade. As mentioned before, the lack of direct interactions makes it particularly difficult for cloud providers to directly shape the affective relationship with the consumer. Nevertheless, we control for the established interrelationships between these five elements of cloud service success, that have, as our literature review revealed, not been tested in their unity yet. Figure 1 illustrates the five elements of cloud service success and their individual contributions.

2.3 A Dedication-Constraint Model of Cloud Success

In order to be successful, providers must influence the success elements that are important to generate revenues and to gain and retain the user base. Two contrasting mechanisms have been found to shape the maintenance of service relationships: dedication-based and constraint-based relationship mechanisms (Bendapudi and Berry 1997). Both mechanisms are based on a dependence of the user on the provider, but the underlying reasons for this dependence are quite different. We argue in the following that these mechanisms, that can be designed or influenced by the cloud provider, influence different elements of cloud success and can therefore be used strategically to reach cloud services' goals. In particular, our model postulates that dedication-based mechanisms are important for gaining and retaining a user base while constraint-based mechanisms help generating revenues.

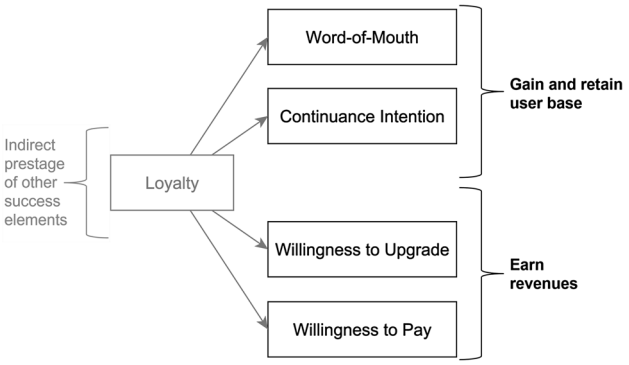

Fig. 1 Elements of cloud service success

Constraint-based maintenance occurs, if a party is dependent on the relationship partner, because ending the relationship is costly. For cloud services, this refers to the economic, psychological, or social costs that would occur when the user ends the relationship with the cloud provider. These costs are referred to as switching costs. Two types of switching costs can generally be differentiated: sunk costs and procedural switching costs (Jones et al. 2007; Beatty et al. 2012). Due to the low investment necessary to adopt a cloud service, procedural switching costs are most important in this scenario. Procedural switching costs involve the time, effort, and hassle of finding and adapting to a new provider (Jones et al. 2007). For cloud services, switching implies two major steps: retrieving the data from the cloud provider and uploading it to the new service. Switching costs for cloud services can also be of social nature (Jones et al. 2007), for instance reflected in the lost benefit of sharing files with other users of the same service. All of these switching costs can be altered by the cloud service provider through different terms of service, openness of the interfaces and so on.

Dedication-based relationship mechanisms create dependence due to the perceived benefits that a user receives from the provider. This part of relationship maintenance can be characterized through cumulative customer satisfaction, defined as customers' total performance experience of a service provider to date (Gelbrich and Roschk 2011). Cumulative satisfaction thereby forms consumers' dedication, described as the prospect of long-term benefits from the service. These long-term benefits

can be influenced by the cloud provider by offering different terms or features depending on the version of the service a user is subscribed to.

Both mechanisms can influence the user-base or revenue-oriented goals directly or influence them indirectly through shaping the users' loyalty to the cloud service. Influence factors on loyalty have been studied extensively in psychology and marketing research (Oliva et al. 1992; Olsen 2002; Kim et al. 2002; Lam et al. 2004; Otim and Grover 2006; Cyr 2008; Kim et al. 2009). The attachment to the service can be influenced by the dedication in terms of satisfaction (Lam et al. 2004) and also by the constraints of the user (Kim and Son 2009). The latter influence is based on specific investments that have led to routines and procedures for dealing with the provider. Due to its large influence in previous studies, we control for the effects of loyalty as a variable that characterizes the relationship between the user and the provider when studying the effects of dedication- and constrained-based mechanism on user-base- and revenue-related elements of cloud success.

2.3.1 *Dedication-Based Relationship Mechanisms*

Our dedication-constraint model in Fig. 2 proposes that satisfaction as a dedication variable influences the success-driving outcomes word-of-mouth and continuance intention. According to Bendapudi and Berry (1997), advocacy in terms of word-of-mouth is a dedication-based behavioral outcome. A key motivation for WOM is a consumer's experience with the service. This service experience produces "a tension which is not eased by the use of the product alone, but must be channeled by way of talk, recommendation, and enthusiasm to restore the balance" (Dichter 1966). Thus, affective states of either valence stimulate WOM transmissions (Westbrook 1987) and satisfied and dedicated consumers are likely to engage in positive WOM (Gittell 2002). In contrast, constrained customers may perceive the situation as forced and have only reduced interest in spreading positive word about the service. Accordingly, we predict that satisfaction, but not switching costs, will positively influence the level of word-of-mouth. A number of studies show the link between customer satisfaction and WOM in B2C and B2B contexts (Hennig-Thurau et al. 2002; Gittell 2002; Chiou et al. 2002; Heitmann et al. 2007; Johnson et al. 2008; Brady et al. 2012). Since the recommendation of a service with unsatisfying cloud service would put the recommender socially at risk (Reichheld 2003), it is rational to only spread positive word about a service that the user is really dedicated to.

Continuance intention refers to the user's intention to keep using their particular service. In contrast to other B2C scenarios, the use of a cloud service is continuous and cannot be separated in episodes such as purchases and repurchases. Such repeated-use was described as a dedication-based behavior (Bendapudi and Berry 1997). A user who has high satisfaction with the service has strong incentives to continue using it in the future. In contrast, a user who feels that a lock-in situation (i.e., high switching costs) constrains him in leaving the relationship with the provider will be reluctant to use the service more than necessary. Accordingly, he develops no dedication to continue using it in the future. Overall, we thus propose that satisfied cloud service users will continue using the

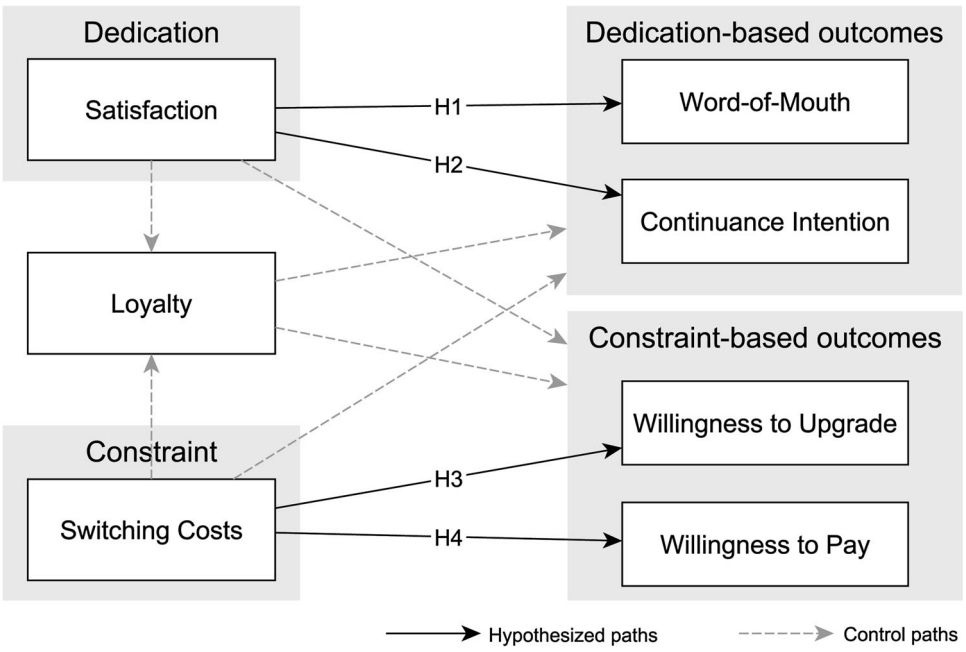

Fig. 2 A dedication-constraint model of cloud success

service (continuance intention) and also spread positive word about it (word-of-mouth):

H1 Consumers' satisfaction with the service is positively related to their level of word-of-mouth.

H2 Consumers' satisfaction with the service is positively related to their level of continuance intention.

2.3.2 *Constraint-Based Relationship Mechanisms*

Switching costs create a lock-in situation that constrains the users options, since he cannot leave the cloud provider-user relationship without incurring economic losses (Ray et al. 2012). These constraints can be based on learning how to use a particular service, costs or efforts of terminating the service relationship such as moving data to another service, and losses that are based on social connections to peers that the user can no longer interact with. Bendapudi and Berry (1997) identify acquiescence as a constrained-based behavioral outcome. Acquiescence refers to the degree to which the user adheres to the cloud provider's requests (Morgan and Hunt 1994). Willingness to pay for a service that was previously provided for free corresponds very well to the notion of acquiescence, since the user accepts new conditions set by the provider. As switching costs are actual costs that occur, if the service relationship is terminated, consumer may accept the additional costs for service continuance as long as they are lower than the alternative option of switching providers. Studies on price premiums also suggest that switching costs may lead to higher willingness to pay (e.g., Chen and Hitt 2002).

At a certain point, customers face limits of their current service, e.g., in terms of storage or number of shared folders. In this case, users may either purchase an upgrade for their current service or open an additional free account at another cloud provider. As the characteristics of cloud services (low upfront commitment) make it generally easy for the user to create an account, willingness to pay for an upgrade depends on the users' individual switching costs. If moving certain loads to another provider comprises specific constraints (e.g., social connections are lost, service specific investments cannot be transferred), the user should have a higher likelihood to purchase an upgrade. With functionality being similar across cloud services, it is not the satisfaction with a specific service, but the users' constraints that shape revenue generation. Overall, we expect the revenue streams can be generated in situations where individuals face constraints:

H3 Consumers' switching costs are positively related to their WTU.

H4 Consumers' switching costs are positively related to their WTP.

Figure 2 presents an overview of our research model.

3 Method

Our dedication-constraint model of cloud success was tested using survey data from an online questionnaire among actual users of cloud storage services. We chose cloud storage services as instantiation of cloud services because our pre-study revealed they are the most widely diffused cloud service among consumers (compare also Zetta 2010) and share the typical characteristics of other cloud-based services (e.g., appearance of infinite computing resources available on demand, elimination of an upfront commitment, ability to pay for use of computing resources, see Armbrust et al. 2010). At the same time, this cloud service type was the only one that has seen sufficient diffusion to derive the representative sample of cloud users that we aimed for using our two-step sampling procedure which we discuss below. Moreover, they are characterized by very low marginal costs. These characteristics and the highly competitive situation in growing cloud markets provide incentives to offer basic functions like file-sharing, synchronization and a certain amount of storage for free and emphasize the importance of satisfying and binding customers. Still, cloud storage services need to identify ways to generate revenues. Therefore, they are a prime instantiation for studying the interrelationships between these success elements. In the following, we describe the measurement model development as well as the survey deployment and data collection procedures.

3.1 Measurement Development

All items used in our study were adopted from existing measurement scales. However, they were adapted to the context of our study. On grounds of the critique raised about the validation of scales in the IS discipline (e.g., Boudreau et al. 2001; MacKenzie et al. 2011), we decided to take the extra effort and re-validate our constructs in the new context. This process included the definition and assessment of the domain and dimensionality of the constructs using two sorting procedures (Moore and Benbasat 1991) and the assessment of content validity using a rating method (Hinkin and Tracey 1999; MacKenzie et al. 2011). We pilot tested the preliminary instrument 196 participants. After the pre-test, the respondents were asked to give open feedback regarding composition of the survey, overall time, and other issues they experienced. Following the pre-test, the instrument was shortened, refined, and validated

for its statistical properties. In the final survey, all principal constructs were measured as first-order reflective constructs using three or more indicators. An overview of all measures and their sources is given in Online Appendix A (available online via http://www.springerlink.com).

3.2 Survey Deployment and Data Collection

We collected our data using an online survey, since regular online access is a prerequisite for usage of such a cloud service. Since little is known about which part of the internet population is using cloud storage services, we spent extensive resources deriving a representative panel of cloud service users. In the first step, a representative set (with respect to gender and age) of all internet users in Germany was preselected (cf. AGOF 2013) using a professional market research firm (2011 responses). Subsequently, only those participants of the survey were surveyed that use the market-leading cloud storage service Dropbox. The distributed few users of other cloud storage services would not have allowed a solid empirical comparison between different cloud services. Since we could not derive statements on differences between cloud services, we chose to focus on the leading service in order to keep other factors constant without losing a significant number of observations. Data collection took place in between November 12th and December 9th 2012. 638 of the 2011 valid respondents declared to use the cloud service. We further eliminated responses from premium service users (42 users) to ensure comparability of responses. The resulting 596 responses were used for the subsequent analysis.

4 Data Analysis and Results

We used structural equation modeling to validate the model and test our hypotheses. Two different types of SEM approaches exist, covariance-based SEM (CB-SEM) and partial least square SEM (PLS-SEM), which differ in their underlying philosophy and estimation objectives (Gefen et al. 2011). We used covariance-based structural equation modeling (CBSEM using AMOS 22) to be able to make use of the overall inferential test statistic that CBSEM provides and to circumvent the discourse about potential validity issues of PLS based SEM in our (e.g., Goodhue et al. 2012; Marcoulides et al. 2012; Aguirre-Urreta and Marakas 2014) and in other disciplines (e.g., Rönkkö and Evermann 2013; McIntosh et al. 2014).

4.1 Descriptive Statistics of Sample

Table 1 depicts the descriptive statistics of the surveyed Dropbox users. The statistics highlight that the sample consists of heterogeneous sub-groups of low and highly educated, employed and unemployed, low and high income as well as male and female respondents. Since we used the subsample of a representative sample of the German online population, we can assume that our sample population represents cloud storage users very well.

4.2 Measurement Validation

The final measurement models (see Online Appendix A) exhibited standardized factor loadings above the threshold value of 0.7, except one item, which is just below the threshold. The overall values, as depicted in Online Appendix B, suggest an adequate level of individual indicator validity and reliability across subsamples (Fornell and Larcker 1981; Bollen 1989). For constructs to be reliable, composite reliability must be higher than 0.7 (Fornell and Larcker 1981; Nunnally and Bernstein 1994). In our model, all constructs reached composite reliability coefficients above 0.8. The validity at the construct level is assured, because the latent constructs account for the majority of the variance in its indicators on average (MacKenzie et al. 2011). The average variance extracted (AVE) even exceeds 0.6 for all constructs. Discriminant validity of the constructs was evaluated based on the Fornell and Larcker (1981) criterion. Online Appendix B shows that the square root of the AVE for each construct is higher than the variance that the construct shares with every other construct in the model. We also conducted a standard common method bias analysis based on the recommendations of Podsakoff et al. (2003). Our analysis suggests that a common method error does not substantially bias our results.

4.3 Testing the Structural Model

The results of the structural model testing are presented in Fig. 3. The Chi square statistic is 1872.640 with 616 degrees of freedom ($\chi^2/df = 3.040$). The other goodness-of-fit and badness-of-fit tests that are suggested by Gefen et al. (2011) delivered decent values and confirm the overall good fit of the model (SRMR = 0.045; RMSEA = 0.049; GFI = 0.928; AGFI = 0.900; NFI = 0.945; CFI = 0.967). In the following, we present the path estimates and significance levels for our hypotheses and control paths.

We included control variables into our structural model. Beyond age, gender and income as demographic variables, we also included IT experience to check whether the effects can be explained by differences in the users' level of experience with technology. We also tested the impact of other control variables such as internet use, time with the service or cloud knowledge, but they had no significant effect on any variable in the model nor did they affect any

Table 1 Descriptive statistics of Dropbox users (free version)

Gender		**Income**	
Female	236 (39.6%)	<€500	51 (8.6%)
Male	360 (60.4%)	€501–€1500	121 (20.3%)
Age		€1501–€2500	147 (24.7%)
16–29	312 (52.3%)	€2501–€3500	92 (15.4%)
30–44	152 (25.5%)	>€3500	86 (14.4%)
45–59	89 (14.9%)	Not specified	99 (16.6%)
60+	43 (7.2%)	**Occupation**	
Education		In training	214 (35.9%)
No education	2 (0.3%)	Employed	307 (51.5%)
Secondary school	120 (20.1%)	Unemployed or retired	72 (12.1%)
Higher education	179 (30.0%)	Not specified	3 (0.5%)
Completed vocational training	108 (18.1%)		
University degree	183 (30.7%)		
Doctorate degree	4 (0.7%)		

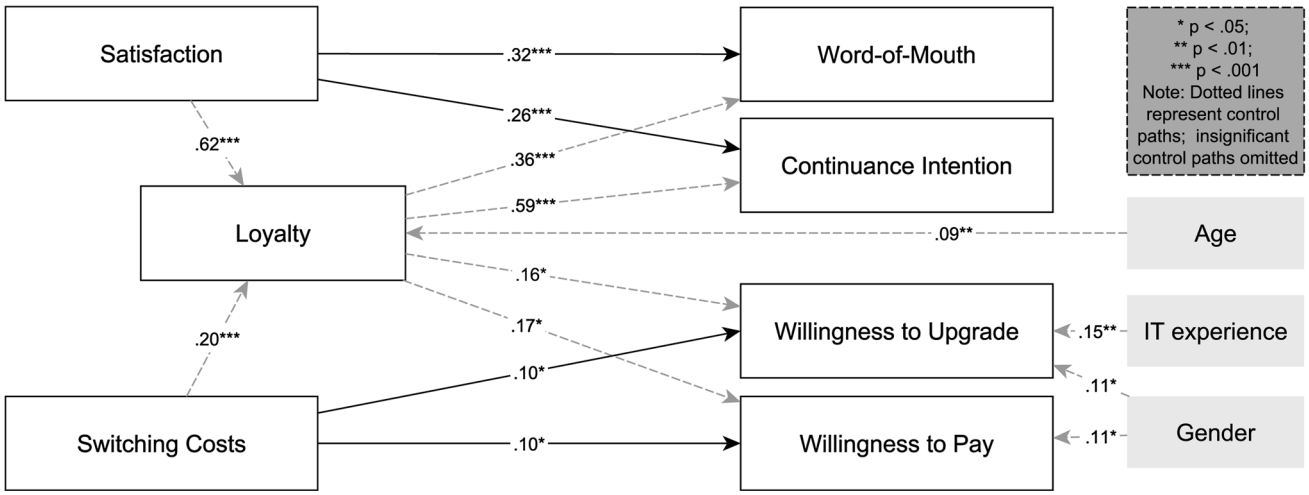

Fig. 3 Structural model results

path coefficients. In order to have a parsimonious model, these controls were dropped from the final analysis. Regarding the other control variables, we found significant effects of age ($\beta = 0.09$, $p < .01$) on loyalty. Furthermore, IT experience and gender had an effect on willingness to upgrade. While users with more IT-experience indicate a higher willingness to pay for a higher service level ($\beta = 0.15$, $p < .01$), females indicated a lower willingness to do so ($\beta = 0.11$, $p < .05$). Females also indicate a lower willingness to pay for the same service level ($\beta = 0.11$, $p < .05$). We furthermore controlled for the well-established effects of loyalty on the other outcome variables. We find strong effects on all four outcomes, with the strongest effects of loyalty on continuance intention ($\beta = 0.59$, $p < .001$), followed by word-of-mouth ($\beta = 0.36$, $p < .001$), willingness to pay ($\beta = 0.17$, $p < .05$) and willingness to upgrade ($\beta = 0.16$, $p < .05$). As suggested by past studies, loyalty by itself was significantly influenced by the level of satisfaction ($\beta = 0.62$, $p < .001$) and switching costs ($\beta = 0.20$, $p < .001$). The model explained 50.8% of the variance of loyalty. Overall, these confirmations of established findings increase the nomological validity of our model.

Regarding our hypotheses, we find a strong relationship between satisfaction and word-of-mouth ($\beta = 0.32$, $p < .001$), confirming H1. As expected, switching costs had no meaningful influence on word-of-mouth ($\beta = 0.03$, $p = .39$). We also find strong support for H2, postulating the impact of satisfaction on continuance intention ($\beta = 0.26$, $p < .001$). Our control path from switching costs to continuance intention was insignificant ($\beta = -0.05$, $p = .13$). Regarding switching costs, our results indicate a strong impact on willingness to pay ($\beta = 0.10$, $p < .05$), confirming H3. Again, the control path from satisfaction to willingness to pay was insignificant ($\beta = 0.10$, $p = .10$). We also find support for the last

hypothesis (H4), that switching costs influence the willingness to upgrade ($\beta = 0.10$, $p < .05$), while satisfaction had no effect on this behavioral outcome ($\beta = -0.05$, $p = .46$). Overall, our model explained 41% of the variance of WOM, 61% of the variance of continuance intention, 10% of WTP and 8% of WTU. Figure 3 depicts the overall results of the structural model test. Please note that insignificant paths are omitted from the graph for reasons of clarity and comprehensibility.

5 Discussion

Consumer cloud services are characterized by high fixed costs and very low marginal costs and thus tend to rely on a freemium model. Prior studies on the freemium models in other contexts have mostly focused on the conversion of free users to premium (Liu et al. 2014; Wagner et al. 2014; Koch and Benlian 2016; Hamari et al. 2017). However, consumer cloud services have to balance two often divergent goals: building and retaining a large customer base and skimming customers' willingness to pay. The objective of this study is to develop and test a parsimonious model that examines the elements of cloud success and the mechanisms that drive these success factors. In the following, we present our major findings regarding the different elements of cloud service success. Subsequently, the theoretical and practical implications as well as limitations of our study and opportunities for future research are discussed.

5.1 Key Findings

We find empirical support for loyalty as the strongest driver of WOM. This finding is in line with the assumption that users are only willing to take the social risks of recommending the cloud service when they are highly dedicated to the service, as highlighted by Kim and Son (2009) in their study of online services. However, we also find strong empirical support for the positive relationship between satisfaction and positive WOM (Heitmann et al. 2007; Zhang and Bloemer 2008; Brady et al. 2012). The unusually high propensity to share a positive service experience with peers can be explained through two characteristics of consumer cloud services: first, WOM is spread through online channels. The offline channel usually provides a wealth of social bonding or personal fortitude among sender and receiver. These opportunities are absent in the online channel through which most cloud service referrals are distributed (Dellarocas 2003). Here, WOM spreads much faster, is less personal, and thus puts the customer's social image less at risk than in offline scenarios (Reichheld 2003). Second, the additional benefit of an increasing customer base (improved opportunities for file sharing and – in some cases – more storage as an incentive), which motivates WOM activities, is not limited to loyal customers, but is instead a goal of all users positively experiencing the service. Thus, both satisfaction and loyalty drive WOM for cloud services.

Cloud service characteristics such as low upfront commitment indicate that the adoption of a service is only the first step while keeping the user is the challenging part. Prior studies have suggested that switching costs are an effective measure for managing the current user base (Lam et al. 2004). However, our results suggest that only a strong dedication to the service creates an urge to remain within this service relationship.

The last set of success elements, WTP and WTU, are extremely important for providers in the context of cloud services as revenues are generated based on a freemium revenue model (Teece 2010). By distinguishing two different types of revenue generation, we are able to develop more finely grained insights on the potentials for revenue stream generation. Unlike prior marketing research (Homburg et al. 2005), our study shows that customer satisfaction has no direct effect on customers' WTP for retention in the context of cloud services. Few previous studies also found no support for the direct positive relationship between customer satisfaction and WTP, e.g., in the contexts of consumer goods (Zhang and Bloemer 2008) and travel services (Homburg et al. 2009). However, these contexts are hardly comparable to our study. Moreover, we find a slightly negative non-significant relationship between satisfaction and willingness to upgrade. This finding implies that a high level of satisfaction can have no, or possibly even negative consequences for the firm's revenue, especially in a freemium environment, since consumers who are very satisfied with their current service level have little incentive to invest financial means in additional features or capacity. Research in the area of gaming, where virtual goods can be seen as a type of upgrade, indicates that satisfaction may in fact be negatively related to willingness to pay (Hamari 2015). Prior research on revenue generation for freemium services has mainly concentrated on managing satisfaction with the free service as a central concept for increasing revenue streams (Liu et al. 2014; Wagner et al. 2014). Our study adds a different perspective to this discourse and reveals that constraints in terms of switching costs are the key for cloud providers to yield profits, besides the well-established construct of loyalty. What needs to be kept in mind: reaching customer loyalty is especially difficult for cloud providers, because they are hardly able to establish social bonding or personal fortitude as is common in offline service scenarios (Oliver 1977). Therefore, provider-

induced constraints are a powerful mean to generate revenue streams for cloud services.

5.2 Theoretical Contribution

Overall, our study aims to make two contributions to theory. First, we provide compelling evidence that it is not sufficient to focus solely on one element of success or one mechanism when managing and studying digital consumer services as most past studies have done (cp. our literature review). The results of our investigation on the interrelationships between satisfaction, switching costs, loyalty, WOM, WTP and WTU emphasize the necessity to move away from simple models focusing on single outcome variables. For instance, a focus on satisfaction as a driver of the dedication-based mechanisms would neglect the necessity to generate revenues. This simplification would involve the danger of incorrect inferences or strategies. Our study implies that we need to develop theories that account for the multidimensional nature of cloud service success and incorporate the interrelationships between the different elements of success. Our model of cloud success is a first step in this direction. Second, we identify and empirically test dedication- and constraint-based mechanisms of relationship maintenance for freemium business models that need to balance growth and revenue generation. Our results indicate that dedication is important to grow and keep a substantial user base while constraints help generating actual revenues. Regarding the latter, we introduce a precise conceptual differentiation between willingness to pay for retention and willingness to pay for an upgrade. While previous studies have used both types of willingness to pay synonymously, the differentiation between the two strategies to generate revenue streams for cloud services is important because they relate to different strategies that cloud providers can employ, i.e., charging existing customers for their current service level, or generating additional needs via the free services that customers are willing to pay for.

5.3 Implications for Practice

In the following, we derive recommendations for three generic strategies that are being applied in practice: development, retention, and habituation (see Table 2). Every business must, sooner or later, generate revenue streams. In a freemium environment, this can be either willingness to pay for an upgrade or willingness to pay for retention. The three strategies differ with respect to their primary focus on willingness to pay for upgrade (development), for retention (retention), or a combination of the two (habituation). While the rationale behind these strategies has been widely discussed in research and practice (Kumar 2014; Wagner et al. 2014; Koch and Benlian 2016), we highlight how the viability strategies can be successfully applied based on the insights produced by our study.

Cloud providers pursuing the *development* viability strategy mainly aim at generating revenue streams based on transforming free users into paying customers and at extending the user base through free service offerings. The goal of these services is to make free users become premium users. A common suggestion for providers – using the development viability strategy – is to design the free and premium versions of the service in a way that the premium service is clearly distinguishable from the free version and possesses an identifiable added value which is desirable to a broad audience. Preferably, some advanced user objectives cannot be achieved with the free version (Wagner et al. 2014). This is for instance hardly the case for premium services that offer an ad-free interface. Based on our results, the development strategy makes it necessary to continuously manage dedication and constraints, i.e., simultaneously develop satisfied customers and increase the switching costs for users. This duality of requirements is a potential explanation for why so many services fail in applying this model successfully (Needleman and Loten 2012). A positive example of a cloud service pursuing this development strategy is Prezi, a cloud presentation software service for presenting ideas on a virtual canvas. The free version allows users to create presentations that are publicly visible. Moreover, users are able to collaborate and present on Prezi using a small amount of free cloud storage. While the free version of Prezi is a useful tool for consumers and thus drives dedication, increased use may foster the need for premium features like more storage, privacy, or editing presentations offline. However, as users have started creating presentations on the platform, they face severe switching costs since the materials can hardly be moved to another service. Prezi successfully utilizes dedication- and constrained-based relationship mechanisms with users to increase the customer base and generate sufficient revenues.

Cloud providers pursuing the *retention* viability strategy mainly aim at generating revenue streams based on switching to a subscription revenue model at an opportune point of time (Preuschat 2013). In contrast to the development strategy, providers focus on one goal at a time: They use the free version to grow fast and monetize later. Based on our results, providers who attempt to become successful using this strategy need to make sure that the free version highly satisfies the needs of the user and creates a strong dedication. Moreover, providers should wait with switching to a subscription model until a large number of users is affectively committed (to keep user base) and faces high switching costs (to skim users' willingness to

Table 2 Strategic implications for cloud service providers

Strategy	Description	Primary type of willingness to pay	Recommendations for the use of relationship maintenance
Development	Transform free users into premium users	Willingness to pay for upgrade	Continuous: manage dedication and constraints simultaneously
Retention	Switching to a subscription revenue model at an opportune point of time	Willingness to pay for retention	Time variant: focus on dedication first and implement constraints before switching revenue model
Habituation	Combination of development and retention strategy	Willingness to pay for upgrade and for retention	Focus: emphasis on constraints to force users to upgrade/pay

pay for retention). An example of a cloud service that has successfully switched to a subscription model after having initially offered a free version is Chargify LCC. The provider of billing software was successful in this transformation, because they had a considerable number of customers who faced a strong lock-into Chargify's offering. Therefore, Chargify turned into a successful cloud service in terms of user base and revenues.

Cloud providers pursuing the *habituation* viability strategy aim at generating revenues by skimming both types of willingness to pay, i.e., for the same service or for an upgrade. In doing so, they offer each individual user a long, possibly hidden, trial phase which offers certain premium features for free (Koch and Benlian 2016). At an opportune time, they end the trial phase and rely on customers who have adjusted their preferences or their habits towards the premium features and are therefore willing to pay for keeping the same service level that was free before. At the same time, they keep effective versions of the free and premium service and try to persuade free customers to become premium users. Apart from the guidelines for the other two strategies that the habituation strategy borrows from, our results suggest that the duration of the trial period should be extensive, allowing users to become highly satisfied with the service and creating strong, potentially socially driven switching costs. A good example of a cloud service pursuing the hybrid viability strategy is Dropbox. Dropbox offers a free account with a set storage size and paid subscriptions for accounts with more capacity. In 2012 and in 2015, Dropbox launched the program "The Great Space Race" that let college students gain up to 25 GB of free storage space for two years. The program was meant to increase Dropbox's market share among students, but at the same time intended to accustom those users to using more storage than the free version offers. During that time, users unconsciously changed their behavior in using Dropbox towards a higher level of (storage) requirements, e.g., by changing their sharing behavior in collaborations. After the long period of 2 years, many Dropbox users were willing to pay for keeping the same amount of storage capacity, since their habits had changed and they did not want to end active collaborations with partners. The habituation viability strategy therefore tries to combine the strengths of the retention and the development strategy.

The choice for a specific strategy depends on a market specific assessment whether dedication- and constraint-based mechanisms can be successfully influenced or not. In any case, our results provide specific recommendations that have been carved out through our multidimensional conceptualization of cloud success. These recommendations can be used by cloud providers to develop a successful position in their particular competitive cloud markets.

5.4 Limitations and Suggestions for Future Research

First, cloud storage services were used as a study context for the evaluation. Although cloud storage services are widely adopted by internet users and exhibit the typical characteristics of cloud computing, future research should re-examine elements of success for other types of cloud services such as platforms (e.g., enterprise software in the cloud) or services exhibiting network effects where dedication- and constrained-based relationship mechanisms play a role. Second, the explained variance for willingness to pay and upgrade appear to be low compared to the other dependent variables in our study – although we have implemented the latest measures for those constructs. This phenomenon is not exclusive to our study. Extant studies also suggest that the expression of actions that relate to spending money fluctuates extremely and thus is more difficult to capture than other outcome variables (Meyer et al. 2008; Kim and Son 2009; Franke et al. 2009). Nevertheless, due to the importance of revenue-related success factors, future studies could try to identify further factors that influence willingness to pay and willingness to upgrade. Third, our study has conceptually distinguished willingness to upgrade and willingness to pay as two different sources of revenue and provided evidence that they are also empirically different. Future research may dig deeper into the differences between the two and identify levers that influence only one of the two. Our results give a first indication that there might be individual differences, since IT experience has a significant influence on willingness to upgrade but not on willingness to pay for retention. Fourth, our findings regarding the effects of satisfaction and loyalty

on willingness to pay contradict previous studies. One possible explanation for this deviation is that we are the first to investigate these relationships within the nomological network of the other success elements. We explain these findings by the unique characteristics of cloud services compared to other contexts. However, this finding calls for further research that challenges these relationships in other scenarios and identifies contingency factors in order to create a broader understanding of the development of willingness to pay in different online service scenarios.

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How to Succeed with Cloud Services? – A Dedication-Constraint Model of Cloud Success

Manuel Trenz, Jan Huntgeburth, Daniel Veit

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Appendix (available online via http://link.springer.com)

Appendix A: Measurement Items for Principal Constructs

Table 1 Measurement model

Satisfaction (Lam et al. 2004)*
SAT1: I am very contented with %cloud service%. SAT2: I am very pleased with %cloud service%. SAT3: Overall, I am very satisfied with %cloud service%.
Switching Costs (Jones et al. 2000; Kim and Son 2009)*
SWI1: Switching to a different cloud provider is connected with some hassles. SWI2: It would cost a lot of time and effort to switch the cloud provider. SWI3: Problems could arise when switching to a different cloud provider. SWI4: Switching to a different cloud provider is a complex process for me.
Word-of-Mouth (Kim and Son 2009)*
WOM1: I will invite my friends to use [cloud service]. WOM2: I will recommend [cloud service] to others. WOM3: I will invite my friends and acquaintances to [cloud service].
Continuance (Bhattacherjee 2001)*
CON1: I intend to continue using %cloud service% rather than discontinue its use. CON2: My intentions are to continue rather than discontinue using %cloud service% CON3: If I could, I would like to continue my use of %cloud service%.
Willingness to Pay for Retention (Kim and Son 2009)$^{+}$
Imagine [cloud service] would no longer be freely available. How likely are the following statements? WTP1: I am willing to pay a one-time only fee of € 5 for [cloud service]. WTP2: I am willing to pay an annual fee of €3 for [cloud service]. WTP3: I am willing to pay a semi-annually fee of € 1.50 for this service.
Willingness to Pay for Upgrade (Vock et al. 2013)$^{+}$
WTPU1: I am willing to pay a premium for additional services of [cloud service]. WTPU2: I am willing to pay a premium for advanced features (e.g., more storage, better access) of [cloud service]. WTPU3: I will upgrade to paid [cloud service] account soon.
Loyalty (Ray et al. 2012)*
LOY1: It means a lot to me to continue to use [cloud service]. LOY2: I feel loyal towards [cloud service]. LOY3: I consider myself to be highly loyal to [cloud service].
IT Experience*
ITE: I know a lot about cloud services.
Notes: * Measured on a Likert scale from 1 (strongly disagree) to 7 (strongly agree); $^{+}$ Measured on a probability scale from 1 (very unlikely) to 100 (very likely)

Appendix B: Measurement Model Results

Table 2 Construct level measurement evaluation

Constructs	Variable Name	Factor Loading	Items per Construct	AVE	Composite Reliability	Mean	Standard Deviation
Satisfaction	SAT1	0.88	3	0.79	0.92	5.24	1.07
	SAT2	0.86					
	SAT3	0.92					
Switching Costs	SWI1	0.89	4	0.73	0.91	2.77	1.34
	SWI2	0.88					
	SWI3	0.81					
	SWI4	0.83					
WOM	WOM1	0.95	3	0.78	0.92	3.77	1.27
	WOM2	0.79					
	WOM3	0.91					
Continuance	CON1	0.96	3	0.84	0.94	5.76	1.27
	CON2	0.96					
	CON3	0.82					
WTU	WTU1	0.94	3	0.80	0.93	8.24	11.81
	WTU2	0.88					
	WTU3	0.87					
WTP	WTP2	0.60	3	0.68	0.86	23.27	24.49
	WTP3	0.92					
	WTP4	0.91					
Loyalty	LOY1	0.81	3	0.68	0.87	5.11	1.24
	LOY2	0.82					
	LOY3	0.85					
IT Experience	ITE	-	1	-	-	4.59	1.37
Internet Use	IUSE	-	1	-	-	5.00	3.23
Age	AGE	-	1	-	-	33.19	13.88
Gender	GEN	-	1	-	-	0.60	0.49
Income	INC	-	1	-	-	4.61	2.10

Note: WTU and WTP were measured on a probability scale from 1-100. All other latent variables were measured on a Likert scale from 1-7.

Table 3 Composite reliability, average variance extracted and correlations

	CR	AVE	SAT	SWI	WOM	CON	WTU	WTP	LOY
Satisfaction (SAT)	0.92	0.79	**0.89**						
Switching Cost (SWI)	0.91	0.73	0.04	**0.85**					
Word-of-Mouth (WOM)	0.92	0.78	0.57	0.12	**0.89**				
Continuance Intention (CON)	0.94	0.84	0.65	0.09	0.53	**0.92**			
Willingness to Upgr. (WTU)	0.93	0.80	0.09	0.10	0.21	0.12	**0.90**		
Willingness to Pay (WTP)	0.86	0.68	0.22	0.12	0.31	0.23	0.43	**0.82**	
Loyalty (LOY)	0.87	0.68	0.67	0.21	0.57	0.75	0.18	0.25	**0.83**

Note: The diagonal elements (in bold) represent the square root of AVE
AVE: Average variance extracted; CR: Composite reliability.