

# **The Freemium Business Model Insights and Challenges**

Bachelors Thesis



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## List of Abbreviations

F2P .....	Free-2-Play
IAP .....	In-App-Purchase
OTP .....	One-Time-Purchase
PDE .....	Personal-Data-Economy
PFP .....	Pay-For-Privacy
UI .....	User-Interface

## **Abstract**

In the digital age, Freemium has become a widely adopted business model for app developers and subscription service providers. However best-practice guidelines based on academic evidence are still hard to find. To cope with this problem, this thesis gives an extensive overview of the recent literature on Freemium, providing relevant insights for managers wanting to optimize their business case. Specifically, this thesis presents practices stemming from empirical research for fostering conversion and retention and evaluates their applicability for real-life adoption. A dedicated chapter covers best-practice approaches for free-to-play games — a major user of Freemium. Additionally, this thesis highlights the impact of social communities on the Freemium business model and illuminates the emerging relevance of Freemium in the private-data-economy. Lastly, the findings are critically evaluated and limitations, as well as future avenues for researchers, are presented.

# 1 Introduction

Through the rise of the digital age, new business models have developed that cater the specific needs of firms operating on the internet. One prominent example is the Freemium Business Model.

It was not until the internet was invented that a wholly new class of goods came into existence, namely *digital goods* such as music downloads, ebooks or even entirely virtual goods. With the growing importance of these goods, Freemium became the center of interest for many subscription providers and app developers worldwide. According to the app analytics company AppAnnie (2017), the majority of app publishers use Freemium, 71% among gaming companies and 52% among others. But not only app developers favor Freemium as a monetization strategy: In a survey of 205 German online news portals, roughly 66% indicated that they use the Freemium model (BDZV, 2016).

From a marketer's perspective, digital goods have a significant advantage over regular goods: Because of very low marginal production costs and alternative revenue streams such as personal data or advertising it is possible to give them away for free while still generating revenue. Thus, in the past, a business model such as Freemium would not have been possible. Today, however, the Freemium Business Model is one of the most heavily adopted business models for digital companies.

Although widely used, research on the Freemium business model is still thin on the ground. Academically substantiated insights in best practice approaches are hardly available and firms utilizing Freemium have to rely on own experiences or online resources that often base on assumptions or one-sided observations. This thesis tackles this problem by providing an extensive overview of available Freemium literature, deviating best-practice approaches for real-life companies. It presents opportunities to increase revenues and tries to give thought-provoking impulses for optimizing Freemium business cases.

The thesis is structured as follows: First, the theoretical foundations of the Freemium Business Model are presented, providing definitions for virtual goods and the Freemium business model itself.

The main part provides insights into recent research on the Freemium business model, giving best-practice guidelines on how to setup Freemium. Specifically, this thesis will shed light on how to foster conversion and retention, and the influence social communities have on these two goals. Moreover, the emerging pay-for-privacy business model will be presented.

Lastly, the main findings are discussed and implications are derived for firms utilizing Freemium. Additionally, the section presents research limitations and proposes further fields of interest in Freemium research.



## 2 Theoretical Background

This chapter defines virtual goods and provides differentiation from digital goods. Furthermore, the Freemium business model is defined and distinguished from other digital business models.

### 2.1 Definition of Virtual Goods

While the differentiation of virtual goods from physical goods is rather self-evident, we need to take a closer look when distinguishing *virtual goods* from *digital goods*:

Bhattacharjee, Gopal, Marsden and Sankaranarayanan (2011, p. 2) and Lambrecht, Goldfarb, Bonatti, Ghose, Goldstein, Lewis, Rao, Sahni and Yao (2014, p. 3) each proposed several characteristics of digital goods. When combining the results of these two groups of researchers, seven characteristics can be used to identify such goods: (1) digital form (electronic, intangible), (2) no wear-off, (3) near zero marginal cost of production or distribution, (4) capable of being altered or replicated by consumers, (5) lower marginal cost of search than products sold in physical (offline) stores, (6) lower transaction cost than non-digital products, and (7) non-rivalry.

Virtual goods are a subtype of digital goods: Hamari and Lehdonvirta (2010, p. 15) define virtual goods as a form of virtual items sold to users of an online service for real or virtual money. Virtual items can include equipment for a fictional in-game character or badges in social networking sites. These items can serve a practical function such as increased strength in a game or fulfill a social demand such as appraisal in a community.

The main difference between digital goods and virtual goods lies in the artificial rivalry of the latter. Theoretically speaking, virtual goods would be non-rival too, as they are available in an unlimited quantity just like digital goods. Developers, however, being the rule-makers in virtual environments, design goods as rivalrous, in order to make them rare and coveted. For the same reason, they usually prohibit the altering and replication of virtual goods. Additionally, they can add a virtual perishableness leading to a simulated wear-off (Hamari and Lehdonvirta, 2010, p. 26).

Furthermore, virtual goods are dependent on the existence of their respective virtual environment (Hamari, Alha, Järvelä, Kivikangas, Koivisto and Paavilainen, 2017, p. 60). Consumers only receive the right to use the virtual object within the community (Fairfield, 2005, pp. 1053-1054). Without the existence of the virtual environment, a virtual good becomes worthless since the user cannot access it. Digital goods, on the other hand, can be used without a virtual environment. For example, an MP3 music file purchased in Apple iTunes can — once downloaded — be used even without the iTunes Software.

Researchers often classify virtual goods into social, functional and appearance goods (Hamari and Lehdonvirta, 2010; Lehdonvirta, 2009, p. 103): Social goods increase the social status of users inside a virtual environment (e. g., badges, rare items). Appearance goods only serve an aesthetic function, for example by altering the outer appearance of a virtual avatar. Functional goods serve a practical use by increasing the strength or defense of a virtual character (e. g., armory, weapons, potions).

## ***2.2 Definition of the Freemium Business Model***

Business models used in the digital world — especially those for subscriptions or mobile apps — can be classified using the (a) monetization of the initial acquisition and (b) inflicted limitations by the distributor (Deubener, Velamuri and Schneckenberg, 2016, 3-4).

(1) *Freemium*, the name being a portmanteau of the words *Free* and *Premium*, is defined by Lee, Kumar and Gupta (2013, p. 1) as a “hybrid strategy where a firm offers both a perpetually free but limited version of their service, and a premium version with enhanced features that require a fee.” In other words: In Freemium, the basic version is free to use. However, the firm offering the Freemium product or service applies an artificial limitation on the user, that excludes (1a) specific features from the free version or (1b) incommodes the user by showing advertising or crippling the user interface (Hamari and Lehdonvirta, 2010, p. 22). Thus, a characteristic of Freemium is the use of *vertical differentiation*: The free version has a limited set of features making it of lesser quality than the premium version, resulting in price differentiation and segmentation of user groups.

Related to Freemium, but substantially different are (2) *free trials*: The free version is not perpetually free, but rather limited to a specific time frame. After the trial period ends, the user cannot continue to use the app without paying.

Additionally, Freemium needs to be distinguished from the (3) *metered model* or *customer selected sampling* (Halbheer, Stahl, Koenigsberg and Lehmann, 2014) in which the free usage is quantitatively limited. An example for this model would be a paywall of an online magazine that allows a user to read a specific amount of articles, whereas in Freemium a vertical differentiation regarding quality would apply, allowing the user to read “basic articles” but requiring him to purchase “premium articles.”

Products or services that are substantially free and not limited in any way are summarized under the (4) *free to the user* business model.

Products or services the user has to initially pay for before usage are fundamentally different from the Freemium model: In the default (5) *one-time-sale* model, there is no free trial and no option to upgrade. The user pays a one-time fee and can perpetually use the product or service to its full extent.

Recently, however, a combination of the one-time-sale model and Freemium has emerged: The (6) *twinned premium* or *paidmium* uses a mixture of initial payment and limitation of features (Deubener et al., 2016). This means a user can purchase additional premium content, despite the fact, that he already paid for the basic version.

**[Insert table A (Page 26) here.]**

The growing success of Freemium stems on three major attributes this business model provides: First, by offering a free product, companies using Freemium benefit from a fast-growing user base, resulting in a network effect, which increases the value of the product or service solely due to the increasing amount of users. (Boudreau, Jeppesen and Miric, 2017; Katz and Shapiro, 1985). Second, users of the free version may not only verbally spread their knowledge about the product or service, there could also be non-verbal advertising such as the display effect (peers who observe the usage of the product), peer pressure, or social influences

(Jiang and Sarkar, 2009, p. 3). These effects can be summarized as word-of-mouth advertising, a form of advertising that is free for the firm. Lastly, Freemium inhibits a strong demonstration effect: The user can perpetually test the functionality of the free version, which is usually very similar to the premium version. This trialability is known to foster adoption of innovations (Agarwal and Prasad, 1997, p. 568) and enables firms to engage in stronger price discrimination (Niculescu and Wu, 2014, p. 188), generating higher profits. Furthermore, Freemium creates additional revenue streams, such as advertising or selling of user data (Lambrecht and Misra, 2017; Niculescu and Wu, 2014).

While the Freemium Business Model is commonly used for digital subscription models or virtual goods, it is not limited to the digital world and could be adapted for the offline world as well; however, working examples are hard to find.

### **3 Literature Review On The Freemium Business Model**

This literature review will provide an extensive overview of recent scientific findings on the Freemium business model. The first part provides guidelines for an ideal setup of such a business model and explains which factors influence conversion and retention.

The second part summarizes available literature on how social networks and communities influence purchasing decisions and interaction in the Freemium business model.

The third part presents insights on the value of personal data in the Freemium Business Model and users' willingness to pay for privacy.

#### ***3.1 Best-Practices In The Freemium Business Model***

A major challenge for firms utilizing the Freemium business model is to balance conversion and retention of free users. While converting free users to premium users leads to revenues from subscription or single purchasing sales, retaining free users leads to advertising revenue and improved KPIs for obtaining funding (Lee, Kumar and Gupta, 2017, p. 2). However, practices for fostering conversion can hinder retention, while practices for retaining users can deter conversion (Runge, Wagner, Claussen and Klapper, 2016, p. 4).

In the mobile app market, many developers utilize a mixture of in-app purchases (conversion) and advertising (retention). For some apps advertising revenue makes up for most of the overall revenue (Danova, 2014). For some developers, however, in-app purchases are responsible for the majority of revenue (Boxall, 2017). Thus, it is important to highlight both strategic directions in Freemium.

In the following, methodologies for optimizing conversion as well as retention in the Freemium business model will be presented.

*3.1.1 Conversion in the Freemium business model.* Converting free users to premium users can have different meanings for different variations of the Freemium business model. For mobile

applications, conversion means selling in-app purchases to users. Such in-app purchases can be virtual goods, additional features or the removal of ads. For firms using a subscription-based model, conversions means selling a (recurring) premium subscription to the user, usually offering an advanced set of features.

Conversion rates in the Freemium model are quite low, usually being single-digit figures (Gassmann, Frankenberger and Csik, 2013, p. 134). There are several influencing parameters in Freemium that can result in low conversion rates. According to (Runge et al., 2016, p. 3) companies utilizing Freemium face three primary decision layers: How much should be free, how expensive should premium be and how many incentives it sets for users to engage in a viral activity. Additional factors influencing conversion are referrals, quality of information regarding the premium version, price sensitivity of adopters and quality of the free version (Kumar, 2014).

The most severe decision, however, is to decide how much of the product should be free (Halbheer et al., 2014; Runge et al., 2016): A large part of the literature body on Freemium has tried to answer this question:

Wagner, Benlian and Hess (2013) in their study on a Music-as-a-Service (MAAS) provider claim that in the Freemium model users who are satisfied with the free version develop a negative bias towards the premium version (p. 2935). As a result, they infer that the free version has no advertising effect for the premium version (p. 2928). However, they find that the increased functionality of the premium version does have an effect on the willingness-to-pay (p. 2935). Therefore, the researchers recommend decreasing the free content of the product in order to increase the perceived value of the premium version. This way, the demand to switch from free to premium is getting stronger, and users are more likely to upgrade (pp. 2935-2936). However, this study has various limitations: First, the researchers used a quite small, nonrepresentative sample set of students. Secondly, the researchers conducted this study in the context of a MAAS provider. In this type of business model, it is easy for users to become satisfied with the free version, as the premium version offers only a few extra functionalities.

Niemand, Fritzsche, Tischer and Kraus (2015, pp. 15-16) conducted a similar study, strengthening the findings of Wagner et al. They investigated the perceived value of free and

premium versions in the Freemium model. They found that users perceive a higher value with the free version due to a lower level of sacrifice (no money expenditure) and higher perceived quality. They propose that firms should explicitly include labels such as 'free' or 'no payment necessary' to trigger a higher value perception (p. 16). Like the result of Wagner et al. this finding implies that the free version is no advertising for the premium version. However, similar limitations apply here. The researchers also used data from a MAAS provider as a sample set. The free version's perceived value is higher if there is a high premium fit, which is common for most MAAS providers. Niemand et al. (2015) proposed a remedy for this problem: In cases of a high premium fit (functional convergence between free and premium), firms need to improve the transparency and explanatory power of the premium functionalities to emphasize the feature-related benefits. This way the perceived value of the premium version increases and conversions become more likely.

Hamari (2015) comes to a similar result: Using the data of three different online games, in his empirical study he found that a high-level of enjoyment reduces the likelihood of a player to buy virtual goods. Enjoyment can have various reasons, one being the offering of a mostly free game without the need for premium content. This way the user is already satisfied with the free version does not perceive much value with the premium version and therefore buys no in-game content (p. 306). Thus, offering less free content can lead to higher conversions according to his study.

Using empirical data, Runge et al. (2016) also claim that giving away less for free increases conversions and overall profits. This finding is a result of a large-scale field experiment, in which they varied the amount of free content in a mobile app using A/B testing and measured resulting conversion rates. Using this data, they estimated revenues and identified the variant with the lowest amount of free content to be the most profitable. Additionally, they found that managers are biased about their own product. Since they invested a lot of time and capital in the development, they are overly optimistic about the finished product. Hence, they favor a high usage over conversion, resulting in giving away too much for free (p. 25).

Recently, however, a growing amount of researchers started taking sides for increasing the amount of free content in the Freemium model in order to increase revenues:

Using a more representative sample set and more sophisticated research methods, Wagner, Benlian and Hess (2014), extended the study of Wagner et al. (2013), by conducting another field experiment in the context of a MAAS. They investigated how big the premium fit in the Freemium model should be. They found that a user's positive attitude towards the free version attracts him to the premium version, with the free version being advertising for the premium version (p. 266). Thus, companies can increase the probability of conversion by offering more for free. When comparing this study with the former study of Wagner et al. (2013), it appears that for certain groups of users, such as students — who are usually identified by their small size-of-wallet — the free version has no advertising effect. For other user groups, however, there is such an effect. As an implication stemming from this finding, firms should consider the composition of their user base when deciding on the extent of the premium fit.

This study is supported by Deng, Lambrecht and Liu (2018). They analyzed spillover effects in the mobile app market for Freemium applications by observing how the download numbers of a paid premium version changed after introducing a basic free version. While they did not observe a cannibalization effect, they found that the download numbers of the premium version actually increased (pp. 33-34). They attributed this effect to the increased trialability of the product leading to more purchases (p. 34). Although the business model investigated in this study (two independent applications) is not the typical Freemium model (one combined application), conclusions can be drawn for the more traditional model (subscriptions, in-app purchases).

Even if there is a temporary high demand (*demand shock*) for the paid product or service offered, it can be beneficial for the company to offer more for free. Lambrecht and Misra (2017) proposed a *counter-cyclical offering* strategy for Freemium business models: In times with high demand for the product, firms should increase the amount of free content, as this leads to more users and increased premium conversions.

Until today, researchers have not yet reached consensus regarding the extent of the free version in the Freemium model. For now, in their decision, firms should consider various factors such as compatibility with the product, user base and premium fit. A remedy could also be A/B testing, which is an effective method for determining an optimal strategy.



Furthermore, it should be noted, that as an additional result, studies arguing for less premium (Runge et al., 2016; Wagner et al., 2013), found that the overall usage and continuance intention decreased when offering less for free. Thus, increasing conversion can lead to declining retention rates, decreasing the user base and ad revenue.

Nevertheless, not only the balance between free and premium content is an essential question in the Freemium business model, but also the question how the design of the free trial period affects conversion rates. The two major types of trial periods are *Freefirst* (perpetual free version with the option to upgrade to premium) and *Premiumfirst* (premium trial with a setback to the free version after a given time)(Koch and Benlian, 2017). Koch and Benlian (2017) in their study compared the conversion performance of both trial types in an empirical study. They found that utilizing Premiumfirst significantly increases conversion over the Freefirst model. The observed effect was stronger in cases with a high premium fit (pp. 74-75). According to the researchers, the reason for Premiumfirst being the better choice can be attributed to the endowment effect, with the premium version having the higher perceived incremental value (p. 75).

However, managers need to be cautious when applying the results of this study on their business model. Premiumfirst might not be the best choice in every firm. High initial costs occur when the premium version is given away as a trial to everybody. Additionally, some apps might be needed by users only for a short period, with the premium trial being long enough for this purpose. Especially in cases with a low premium fit, firms need to critically assess the possible advantages of Premiumfirst, before implementing it (Koch and Benlian, 2017, p. 75).

Another factor influencing the probability of conversion is the time passed after obtaining the product or service before actually using it. The later the user starts using the product, the smaller the probability that he will purchase a premium add-on. In a study of free-to-play (F2P) games, a significant negative correlation between the likelihood of conversion and the time passed was found: While the conversion rate after one day after the installation was at about 7%, that rate after four days was at only 0.5% (Hanner and Zarnekow, 2015, p. 3331). Thus, Freemium providers should create incentives for users to start using the application right away.

Focussing on loyalty as a driver for in-app purchases, Hsiao and Chen (2016, pp. 25-26) found that various factors such as playfulness, connectedness, and reward do not directly influence the purchasing intention, but do influence loyalty. Loyalty, however, has a substantial impact on conversion, together with attractive pricing. Measures influencing loyalty, therefore, can have a positive effect both on retention as well as conversion rates.

Coming to a similar finding, Hsu and Lin (2016, pp. 48-49) analyzed the influence of app-stickiness, the rate at which users come back to an app (Zott, Amit and Donlevy, 2000, p. 471) — which is a similar construct as loyalty — and social influence on in-app purchasing intentions. They found that app stickiness is positively correlated with the number of in-app purchases. Additionally, social influences not only have a direct positive effect on the purchasing decision, but they also have an indirect influence on the purchasing decision by increasing stickiness. Next to the creation of social communities, firms can increase stickiness by rewarding loyal customers, personalization of the product or establishing reputation in transactional trust (*ibid*).

Appel, Libai and Muller (2016) strengthened these findings: They studied the effect of app-stickiness on the revenues of an ad-supported free and an ad-free premium version in the mobile app market. They found that with increasing app-stickiness ad-intensity increases as well, reducing the revenues from the free version, but increasing the revenues from the paid version (p. 26). In this study, the researchers assume that app-stickiness increases willingness-to-pay due to the increased degree of utilization (p. 24). Thus, by increasing app-stickiness, the higher willingness-to-pay in combination with the negative effects of increased ad-intensity leads to more free users converting to the premium version. Increasing app-stickiness can thus have a significant effect on conversion in Freemium. Best practices on how to increase app-stickiness and retention will be presented in Section 3.1.2.

In their empirical study, Harviainen, Ojasalo and Nanda Kumar (2018) investigated customer preferences in Freemium pricing by conducting workshops along the user-journey. They found that the excessive usage of ads has an adverse effect on conversion. Users prefer to make a forced micropayment to continue to use the app, instead of being annoyed by repeating advertising. Additionally, they found that alternative forms of payment can have a positive effect

on retention. Examples are branded premium content (sponsored by companies), gamified ads or level-based charging (p. 197).

Another way to increase conversion and the overall value of a Freemium product or service is by strengthening network effects. Boudreau et al. (2017) analyzed the impact these effects have on revenues of Freemium and non-Freemium business models. He compared data from before and after the introduction of the GameCenter — a strengthening of network effects — in the Apple AppStore. They found that for non-Freemium business models the revenue gap between market-leader and followers did not significantly change after the introduction of GameCenter. For firms using Freemium, however, this revenue gap was about 4.2 times larger (p. 26). Thus, there seems to be a significant relevance of network effects for the Freemium business model, making them a potential revenue generator.

Adjacent to the practice of conversion are referrals. Referrals, meaning consumer-to-consumer invitations to the product or service, are a frequently used promotional measure in Freemium, basing upon the principle of word-of-mouth advertising. In a study of a large file-storage provider utilizing Freemium, Lee et al. (2013) investigated the impact of referrals on the value of free customers. Using an empirical micro-foundation-based framework, the researchers estimated the worth of a free user to be 2 USD per month. About 65% of the 2 USD could be attributed to referrals alone, making them an important revenue generator for Freemium companies. The remaining 35% were a result of the individual free user eventually converting to premium. (p. 36). In a second study, Lee et al. (2017) did a similar experiment, estimating that 44% of the free users value is attributable to referrals (p. 37). Still, firms to need to be careful when implementing and designing a referral system: When the referral incentive is too high, cannibalization of the premium product can be the result (ibid).

Free-to-Play is a major user of the Freemium model. There is much research available on conversion in the F2P industry, with many valuable implications that are idiosyncratic for games. This paper will provide an in-depth insight into these methods in Section 3.2.

*3.1.2 Retention in the Freemium business model.* As mentioned above, users of the free version can be just as important — or even more important — than premium users in the Freemium

Business Model, as they can generate a steady stream of ad revenue income. Thus it is crucial to retain not only premium users, but also free users. Additionally, retention itself can be a driver for conversion (Appel et al., 2016; Hsiao and Chen, 2016; Hsu and Lin, 2016), leading to a twofold positive effect.

Whereas retention in the subscription model is a well-researched topic in marketing, up to this day there is only few information on retaining users in the mobile app market, especially for F2P games available . Identifying the underlying reason for users' continuance intention in mobile apps has become the focus of various researchers in recent years, however.

In the F2P context, a purchase of in-game content is a significant predictor of continuing use, meaning that if a player buys an in-game item, he is more likely to continue usage. Also, if the user possesses a considerable amount of in-game currency, his continuance intention is higher. Additionally, developers can influence retention by increasing the frequency of rare item and special event distribution (Lee, Hong, Yang and Lee, 2016, p. 1048). According to this study, the sunk cost effect of purchased in-game content and dedicated time in obtaining in game currency leads to retention. Furthermore, increased enjoyment due to purchased in-game goods and player gratification have a positive effect on continuance intention.

Mäntymäki and Islam (2015), using the gratification theory, analyzed data from 374 Spotify users and identified reasons for users to continue the use of the service. They found that enjoyment, discovering new music, and ubiquity are the primary drivers of the continuance intention inside Spotify (p. 9). In a post-hoc analysis, they discovered that enjoyment is the only predictor of continuance intention for free users, whereas for premium users, discovering new music and ubiquity were additional drivers (p. 10). Given the context of the study, this result is intuitive, since these features are very limited in the free version. Mantymaki's findings consort with the findings of Krause, North and Heritage (2014), who studied the gratifications of using Facebook's music listening service.

In a nutshell, not only functional benefits (discovering new music) and economic rationals (sunk costs, remaining in-game currency balance) but also emotional (enjoyment) factors influence continuance intention. Another major predictor is social interaction in the virtual environment. This phenomenon will be addressed in detail in Section 3.3. However, for free

users, emotional factors are most important, as the functional benefits of Freemium products and services are often limited for them.

Knowing what the drivers for continuance intention are, it is also helpful to identify heavy users to effectively incentivize them to stay. Voigt and Hinz (2016) in their study developed a framework for predicting customer lifetime value in the Freemium business model via the initial purchase information. Users, who (a) make a purchase early, (b) spend a high amount on their first purchase, and (c) use credit cards to make the payment tend to have higher customer lifetime value (pp. 113-114). Additionally, the amount a user spends on premium content usually increases with every purchase (p. 117). Incentivizing heavy users can thus help to increase retention resulting in higher revenues. However, the results of this study are solely based on the initial purchase, ignoring subsequent purchases and indirect revenues (ads, referrals). Still, the findings are relevant for managers as initial purchase information is usually available to every Freemium provider, thus offering an easy to use starting point for identifying heavy users.

Strengthening the findings of Voigt et al., Hanner and Zarnekow (2015, p. 3332) also found that retention rates in Freemium are positively correlated with the number of in-app purchases users make. The more in-app content a user purchases, the higher the probability of continuing use.

Derived from the above results, companies should consider lowering prices of premium content or invest in in-app advertising in times of low retention rates. By incentivizing and promoting in-app purchases, long-term revenues from increased retention can exceed the losses from lowered prices.

By studying multiple popular F2P-games Hamari and Järvinen (2012, pp. 16-17) identified additional practices for retaining customers in the F2P context. While some of their findings are specific to the gaming industries, conclusions can be drawn for other types of Freemium as well: By rewarding continuing use through in-app content (e.g., items, badges, acknowledgment), users are incentivized to use the product regularly. Another way would be to penalize absence from the product through loss of status or commodities. Other practices identified by Hamari et al. include providing news about the game (e.g., newsletter, social network feed), on-boarding tutorials, networking and daily lotteries.

### 3.2 *Free-To-Play Games*

Free-to-Play, a subtype of the Freemium business model, has become the default business model for game developers. F2P games are perpetually free to play but exhibit multiple ways of monetization, usually in the form of in-app-purchases (IAP). In the F2P context, IAPs mostly refer to virtual goods such as in-game equipment, UI enhancements or visual badges. However, IAPs can also be additional features (premium version) or the removal of ads.

IAPs are usually one-time purchases and therefore differ from subscription-based purchases, as the access to the purchased good is perpetual and not limited to the lifetime of the subscription.

For developers there are two major reasons to incorporate the Freemium model as a business model in games: First, it enables flexible pricing for players with different levels of willingness to pay. Second, it helps to create a broader range of user segments (Paavilainen, Hamari, Stenros and Kinnunen, 2013, p. 797) enabling improved targeted advertising.

For virtual items the question arises why users would buy them in the first place as they do not serve any real-life functionality, are hard or impossible to resell, and users are not even given the right to possess, but only to access the good (Fairfield, 2005, p. 1082).

Early literature on virtual goods has focused on the performance-enhancing features of in-game purchases. Oh and Ryu (2007, p. 655) in their study proposed a functional/decorative dichotomy of virtual goods, saying that virtual goods do not necessarily need to possess a functional value but can be of solely decorative or ornamental value. Players use such ornaments for self-expression or showing-off.

Lehdonvirta (2009) extended this dichotomy by identifying nine attributes of virtual goods acting as purchase drivers and classifying them into three categories: *Functional attributes* that improve a fictional avatar's performance or enhance functionality, *hedonistic attributes* such as visual appearance and sounds, background fiction, provenance, customizability, cultural references or branding and as a *social attribute* she identified rarity (p. 110). These categories, being closely related to the three attributes (functional, emotional and social) of the classical

consumption sociology (p. 103), show that virtual worlds share the same social dynamics as the real world.

Using a different approach, Cleghorn and Griffiths (2015) studied the intrinsic motivation of players for buying virtual assets, instead of focussing on the good itself. They found that gamers develop an emotional attachment to their virtual avatars (p. 94). Thus, purchasing virtual goods enable the gamers to express themselves (p. 96), feel satisfaction (p. 99), and build social networks (p.94). Buying virtual goods increases the psychological well-being of players.

While these results are somewhat abstract psychological findings, Hamari and Keronen (2017) in their study identified a more concrete rationale: He identified the purchasing decision of virtual goods to be converged into six dimensions: (1) Unobstructed play, (2) Social interaction, (3) Competition, (4) Economic rationale, (5) Indulging children, and (6) Unlocking content (p. 542).

Although the in-game selling of virtual goods has become the default revenue stream for game developers (Alha, Koskinen, Paavilainen and Hamari, 2014; Hamari and Lehdonvirta, 2010), they usually face only low conversion rates of around 2 - 10% (AppAnnie, 2017). To tackle this problem, over time, literature developed on which factors influence conversion in the F2P model.

In the past, literature has been mainly interested in psychological constructs and users' motivation to explain conversion in F2P games and virtual worlds. More recent literature, however, found out that purchase decisions for virtual goods are not solely affected by users' existing general attitudes, consumption values, and motivations, but identified game design and mechanics as an essential driver in converting F2P users (Hamari and Keronen, 2017, p. 539).

Looking at 12 games and virtual worlds, Hamari and Lehdonvirta (2010) used traditional marketing techniques to explain the effects of common patterns in game design. They found that segmentation and differentiation are potent tools for developers. Segmentation in virtual worlds (e.g., character classes, professions, level rankings) creates relevant groups for differentiation and targeting and thus supports in-game marketing. Differentiation in virtual worlds can both

be on the vertical (e.g., increasing strength of in-game weapons) and well as the horizontal dimension (e.g., different weapon classes) (p. 17). Additionally, the researchers identified marketing techniques such as planned obsolescence (item degradation), psychological pricing (currency as a medium), promotions (special occasions) and exclusiveness (artificial scarcity) as commonly used practices in-game mechanics (p. 25).

In a second study, Hamari and Järvinen (2012, pp. 17-18) identified additional game mechanics fostering conversion in F2P games by studying multiple popular online games: Next to the above-mentioned decay and scarcity of in-game items, developers increase conversion rates by introducing collectibles (functional and non-functional). Another often implemented method is the use of double-virtual-currency: In addition to the regular virtual currency that the user gets in exchange for real money, there is a second virtual currency that is obtained using the free part of the game (e.g., selling of harvest in FarmVille). This second virtual currency can then be exchanged for the primary virtual currency and vice versa.

Another way to influence purchasing decisions in F2P games is to include caveats through game design to make the free game burdensome for the player. To overcome these caveats, game developers offer in-game assets that automate tasks or make them more accessible (Evans, 2016; Hamari, 2015; Hamari and Keronen, 2017; Oh and Ryu, 2007). A typical game mechanic in many endless F2P games requires the user to spend much time clicking in order to make progress in the game. In FarmVille for example, players need to click on every single field to weed it, plant crops and harvest them. To speed up this process, they can buy in-game goods such as a tractor to automate the task and make the game more enjoyable (Evans, 2016; Hamari, 2015).

This intentional design of inconvenience is a commonly used method of developers that want to promote in-game purchases (Evans, 2016). However, this practice can have an adverse effect as well. Hamari (2015) found that a high level enjoyment of a game reduces the likelihood of a player to buy virtual goods, while on the other hand enjoyment is positively correlated with continuing usage (p. 306). Thus, implementing caveats in the game design may lead to increased revenue from in-game sales, but reduces usage and advertising revenue. Game developers, therefore, need to find the right balance between designing an enjoyable game to retain users and making it burdensome to increase virtual good sales.



### ***3.3 The Role Of Social Communities In The Freemium Business Model***

Social communities play a significant part in the Freemium business model. In F2P games, communities often serve a crucial role in-game design: Guilds, tournaments, rankings and high-scores, chat-features and gifting are only some forms of social interaction incorporated in games. But also in Software-as-a-Service products, social communities have been established. In Last.fm users can become friends and follow others or send private messages. Spotify and other firms offer similar features, with varying degrees of social interaction.

Multiple researchers tried to answer the question whether social communities affect purchasing behavior in the Freemium business model:

Buying virtual goods to give them to other users as a gift is a major reason for in-app purchases (Wohn, 2014, p. 3363). Implementing such a feature, therefore, could not only increase revenues, but it also heightens the degree of social interaction inside the virtual environment.

Oestreicher-Singer and Zalmanson (2013) studied how the degree of social interaction changes the willingness-to-pay of users in the Freemium business model. They found that it increases as users ascend the so-called ladder of participation inside the social network (p. 610).

Coming to a similar conclusion, Bapna and Umyarov (2015) investigated how the peer-to-peer influence in an online social network affects the likelihood of purchasing premium content. Their study revealed that users with a high degree of social interaction have a by 60% increased chance of purchasing in-app content (p. 1904). Additionally, they found that the effect is stronger for users with a smaller number of friends, compared to those who have a vast network. The researchers attributed this effect to the influence an already adopting user has on his non-adopting friends, exerting a form of peer-pressure on them (p. 1914).

Supporting these findings, Shi, Xia and Huang (2015) analyzed formal and informal social groups and their impact on purchasing decisions in an F2P gaming environment. They conclude, that in games social relationships are particularly strong because of teamwork-requiring objectives (p. 181). Strong relationships inevitably lead to a group-feeling resulting in members conforming to group norms and a bandwagon effect, that makes group members imitate other members activities (ibid). As a consequence Shi, Xia and Huang find that formal as well

as informal social groups influence the purchasing decision of group members (p. 194). This effect, however, can be both positive and negative. Yet, in the default case, new group members will more likely purchase in-game content to be able to conform to the social group faster.

The relationship between social communities and buying premium content is reciprocal. Not only do social communities positively influence the willingness-to-pay of free users, but buying premium content also influences the degree of participation in the social network, thereby again influencing the willingness-to-pay of new, free users. In the context of a social-music-network, premium users compared to free users listen to more songs, create more playlists, publish more forum posts, and gain more friends. (Ramaprasad and Bapna, 2015)

Three of the five studies mentioned base upon a similar sample set, using data from the social network *Last.fm*. This might limit the transferability and generalizability of the findings and presents an opportunity for future research. An additional avenue for future research is the question, how external social networks (e.g., Facebook, Twitter) influence purchasing intentions in the Freemium. Given they have a similar effect as internal social networks, this could be an inexpensive way to increase revenues in the Freemium model.

### ***3.4 Paying For Privacy***

Next to in-app sales, premium subscriptions and advertising revenue, firms using the Freemium model can sell user data to generate money. User data could include personal information (name, demographics, interests) or usage-based data (purchases, behaviors, location data).

In the last years, a new subtype of the Freemium business model emerged due to the growth of the personal data economy (PDE). In the *pay-for-privacy (PFP)* model users are required to pay a specific fee to protect their data from being stored and processed for advertising purposes (Elvy, 2017, p. 1369).

The central question in research on the PFP business model is whether there is a willingness-to-pay for privacy and if, how big it is.

Schreiner, Hess and Fathianpour (2013, pp. 4-5) in their study quantified the willingness-to-pay of users in a freemium-based PFP model. They proposed a fictional premium version

of Facebook and Google which offers privacy protection for a certain additional fee. They found that the optimal price for Facebook is 1.67 euro per month, whereas the optimal price for Google lies between approximately 1.00 euro and 1.50 euro. Although being quite small, there is evidence for a general willingness-to-pay for privacy.

In a second study, Schreiner and Hess (2015) tried to identify the purchase drivers behind the PFP Freemium model using a similar research design. Interestingly they found that perceived internet privacy risk has an only little impact on the purchasing decision. Instead, added value and trustworthiness lead to purchases of the premium version (p. 11). Companies pursuing the PFP model, therefore, need to focus on developing features that create additional value, while being trustworthy when claiming protection to the users' data.

Awareness of online users regarding personal data is, however, changing. Very recently, the General Data Protection Regulation (European Union, 2016) — which severely limits the storing and processing of personal user data by companies — was adopted by the European Union. This led to a rethinking in the PDE and firms started using Freemium as a way to cope with the new regulation.

The Forbes magazine, for example, lets visitors now decide between three options: 1) They get free content, but agree on cookies and tracking, 2) they pay for a mini subscription and agree on cookies or 3) they upgrade to premium and see no advertising and are not being tracked (Neubauer, 2018).

With regard to the increasing awareness of online users towards personal data and privacy — due to regulations and social changes — the age of the two presented studies needs to be critically considered. However, they positively identified a general willingness-to-pay for privacy. For future research, the PFP model thus presents a relevant field of interest.

## 4 Discussion

This final chapter summarizes the findings on the Freemium business model and provides a critical evaluation of the presented results. Implications for managers will be given, that provide guidance on how to set up a Freemium model. Finally, limitations of present research will be discussed, and new avenues for future research will be outlined.

### *4.1 Critical Evaluation*

The literature on the Freemium business model is still in the fledgling stage and up to this day, only a couple researchers started working in this field of research. However, due to the growing importance of digital business models, especially Freemium, an increasing amount of researchers is becoming involved in this topic now.

Some researchers have focused on answering the question of how much of Freemium should be free and how to achieve conversion. Opinions are divided, as one side argues for less free content and the other argues for more free content. One possible reason for the contradictory findings is the difference between the variants inside the Freemium model. It is likely that purchase behavior and the underlying drivers for it are different for games, subscriptions and other models. Thus, publishing studies under the general label "Freemium" can confuse. Additionally, user motivation and perception is consistently changing in the digital world, with privacy being only one example. This leads to a considerable perishableness of Freemium literature.

Nevertheless, there are relevant and useful findings in Freemium literature, which lay the foundation for future research and provide helpful guidelines for companies utilizing this model. Especially for the F2P model, an extensive literature has developed that sheds light on player behavior and optimal game design. However, much of this research has been conducted by the same group of authors, inflicting a shade of researcher bias on these studies.

## ***4.2 Managerial Implications***

Summarizing the findings of the literature review, numerous implications for managers can be derived: When setting up a Freemium business model, firms need to consider different aspects such as user base composition, premium fit, monetization and cost of a free trial in order to find the optimal Freemium design.

If the user base has a low size-of-wallet, the free version has high marginal costs (licensing or infrastructure), and cost-per-thousand (CPM) for in-app advertising is low, companies should offer less for free in order to increase the value of the premium version and deter free-riders, thereby increasing conversion rates and revenue. However, if the user base has a high size-of-wallet, the free version has low marginal costs, and CPM for in-app advertising is high, companies should offer more for free, thereby boosting the advertising effect of the free version, leading to more conversions and revenue.

For many companies, especially with low marginal costs, choosing a Premiumfirst trial over a Freefirst trial can be beneficial, since it makes use of the endowment effect, increasing conversions. Yet, some limitations apply.

In general, the implementation of social communities seems to help increasing the number of IAPs and overall revenue. Whether internal social networks are necessary or external networks have the same effect, is yet to be researched. Basing also on social interaction, a referral system can increase revenues in the Freemium model too, as it not only helps increasing the user base but also helps to estimate the value of a free user.

Free users can be accountable for a significant share of the overall revenue, which is why Freemium companies should consider engaging in activities leading to retention as well. Practices fostering conversion can deter retention and vice-versa. Thus, finding an optimal balance between conversion and retention is a major key to success for Freemium companies, that should be a focus of future research.

For F2P companies, game design is a powerful way to increase revenues: Intentional design of inconvenience and the possibility to design the economics of the virtual environment at will, are helpful tools for promoting conversion.

### ***4.3 Limitations And Future Research***

As already mentioned above, there are various limitations of research conducted on the Freemium business model:

Digital businesses face a high degree of competitiveness and low market-entry barriers. Therefore, firms are reluctant to provide real-life data to researchers. As a result many of the latter use a similar data basis, coming to similar conclusions.

Additionally, research on specific topics is often conducted by the same group of authors, resulting in the risk of researcher bias.

There are plenty of avenues for future research on the Freemium business model: First, with the growing importance of data and the development of new technologies, large amounts of raw data (big data) is becoming accessible for researchers. Given that firms grant access to their data warehouses, researchers could utilize data mining practices to conduct future studies on purchasing behavior. Second, while some research is available on how to foster conversion and retention, there is a lack of literature examining the optimal balance between these two important strategies. An exemplary topic would be the optimal mixture of IAPs and advertising for maximizing revenues.

In a compelling article (Kumar, 2014; Seave, 2014) proposed several ways of fostering conversion. Many of these proposed techniques, however, are not yet empirically researched and solely based on assumptions and real-life experience.

Lastly, emerging variants of the Freemium model have received only a little attention from researchers yet. One example would be the PFP model.

## **Appendix**

## A Tables

(a) Initial Acquisition	(b) Limitation	Business Model
Free	Functionality	<b>(1a) Freemium</b>
Free	User Experience	<b>(1b) Freemium</b>
Free	Time	(2) Free Trial
Free	Usage	(3) Metered Model
Free	None	(4) Free to the user
Paid	None	(5) One-time sales
Paid	yes	(6) Twinned Premium / Paidmium

Table 1: Business Model Typology in the Mobile App Market  
 (Source: Own illustration based on Deubener et al. (2016) and literature review)



## B Literature Review Table

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Appel et al. (2016)	Stickiness and the monetization of apps	SSRN Journal Electronic Journal	Mobile Apps	Analyzes the effect of app-stickiness on Freemium revenue. Incorporates the effects of ad-intensity and willingness-to-pay	App-stickiness increases ad intensity, but lowers the revenues from the free version. However the revenues of the paid version increased due to a higher willingness-to-pay.	+
Bapna and Umyarov (2015)	Do Your Online Friends Make You Pay? A Randomized Field Experiment on Peer Influence in Online Social Networks	Management Science	Subscription-based	Researches the effects of social communities and resulting peer influence on purchasing behavior.	Peer influence causes more than a 60% increase in likelihood to purchase in-game content. Users with a small number of friends experience stronger increase in conversion due to peer influence	++
Boudreau et al. (2017)	Freemium, Network Effects and Digital Competition: Evidence from the Introduction of Game Center on the Apple App Store	Working Paper	Mobile Apps	Investigates how a strengthening of network effects affects the revenue gap between market leaders and followers in Freemium and non-Freemium markets.	An increase in network effects leads to no significant change of the revenue gap between the market leader and followers in non-Freemium markets. However, in Freemium markets the revenue gap was about 4.2 times higher.	+

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Cleghorn and Griffiths (2015)	Why do gamers buy 'virtual assets'? An insight into the psychology behind purchase behavior	Digital Education Review	Free-to-Play	Identifies the motivations of players buying in-app content.	Virtual items help gamers to express themselves, feel satisfaction, and build lasting social connections. Virtual goods have a positive impact on the player's wellbeing.	+++
Deng et al. (2018)	Spillover Effects and Freemium Strategy in Mobile App Market	Available at SSRN	Mobile Apps	Studies the cannibalization and trialability effect of a free version in the mobile app market.	Launching a basic, free version increases the number of downloads of the premium version The effect is due to increased trialability	+
Hamari (2015)	Why do people buy virtual goods? Attitude toward virtual good purchases versus game enjoyment	International Journal of Information Management	Free-to-Play	Analyzes the underlying rationals of users buying in-app content.	Enjoyment is negatively correlated with purchase intentions for virtual goods. Social interactions are positively correlated with purchase intentions for virtual goods. Continuance intention is positively correlated with purchase intentions.	+++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Hamari and Järvinen (2012)	Building Customer Relationships through Game Mechanics in Social Games	Business, Technological, and Social Dimensions of Computer Games	Free-to-Play	Identifies game mechanics and strategies in game design that lead to retention and conversion in the F2P context.	The study proposes various game mechanics for retention, monetization and acquisition	+++
Hamari and Keronen (2017)	Why do players buy in-game content? An empirical study on concrete purchase motivations	Computers in Human Behavior	Free-to-Play	Empirically analyzes the underlying rationals of users buying in-app content.	Purchasing drivers can be summarized into six dimensions: 1) Unobstructed play, 2) Social interaction, 3) Competition, 4) Economical rationale, 5) Indulging the children, and 6) Unlocking content. Purchase motivations of unobstructed play, social interaction, and economical rationale are positively correlated with how much money players spend on in-game content.	+++
Hamari and Lehdonvirta (2010)	Game design as marketing: How game mechanics create demand for virtual goods	International Journal of Business Science and Applied Management	Free-to-Play	Identifies game mechanics and strategies in game design that lead to conversion in the F2P context.	This paper proposes various game mechanics promoting virtual purchases	+++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Hanner and Zarnekow (2015)	Purchasing behavior in free to play games: Concepts and empirical validation	Proceedings of the Annual Hawaii International Conference on System Sciences	Free-to-Play	Studies the purchasing behavior in the F2P context and its implications for CLV calculation.	The earlier a user purchases in-game content, the higher his CLV. Retention rate increases with repeated purchases. The value of purchases increases with subsequent purchases.	+++
Harviainen et al. (2018)	Customer preferences in mobile game pricing: a service design based case study	Electronic Markets	Free-to-Play	Empirically investigates customer preferences in the F2P context in a design thinking setting.	Current challenges of F2P monetization are caused by too direct and aggressive activities used for fostering conversion Instead of continuous reminders and incentives for small micro-payment, users preferred to be given an option to pay once and then continue playing	+
Hsu and Lin (2016)	Effect of perceived value and social influences on mobile app stickiness and in-app purchase intention	Technological Forecasting and Social Change	Mobile Apps	Researches the effect of app-stickiness on purchasing intention. Studies the perceived value of free and paid apps.	Hedonic and utilitarian values significantly influence a user's affective response. Stickiness and social identification significantly influence a user's purchasing intention. Determinants of stickiness between users and potential users are different.	++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Koch and Benlian (2017)	The effect of free sampling strategies on freemium conversion rates	Electronic Markets	Mobile Apps	Tries to identify the optimal sampling strategy for Freemium services.	Compared to Freefirst, Premiumfirst increases conversion likelihood This effect is greater if the premium fit is high	+++
Krause et al. (2014)	The uses and gratifications of using Facebook music listening applications	Computers in Human Behavior	Subscription-based	Identifies the motivators for usage of Facebook Music.	Communication and entertainment gratifications are motivators for using Facebook Music.	+
Lambrecht and Misra (2017)	Fee or Free: When Should Firms Charge for Online Content?	Management Science	Subscription-based	Researches whether Freemium firms can benefit from adjusting the amount of content offered for free.	Firms should offer more free content in times of high demand.	+
Lee et al. (2013)	Designing Freemium: a Model of Consumer Usage, Upgrade, and Referral Dynamics	Dissertation	Subscription-based	Studies the effects of referral systems in Freemium.	The value of free users is about \$22 per year, and the referral program contributes to 65% of this value.	+
Lee et al. (2017)	Designing Freemium: Strategic Balancing of Growth and Monetization	Yale Research	Subscription-based	Studies the effects of referral systems in Freemium.	The value of free users is about \$6.24 per year, and the referral program contributes to 44% of this value.	++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Lehdonvirta et al. (2009)	Virtual consumerism: Case Habbo Hotel	Information, Communication and Society	Free-to-Play	Researches the characteristics of virtual goods in a F2P context.	Virtual goods can fulfill the same social roles as material goods.	+
Mäntymäki and Isilam (2015)	Gratifications from using freemium music streaming services : Differences between basic and premium users	ICIS	Subscription-based	Identifies the motivators for usage of MAAS services and their effect on continuance intention.	The main drivers of continuance intention are enjoyment, discovering new music, and ubiquity Social connectivity has no effect on continuance intention. Users of the premium version experience higher levels of enjoyment and ubiquity than the free users.	+
Niemand et al. (2015)	The Freemium Effect : Why Consumers Perceive More Value with Free than with Premium Offers	ICIS	Subscription-based	Studies the perceived value of free and paid apps inside Freemium proposes implications for firms.	Free services are perceived to have a higher value than premium services. Users perceive fewer sacrifices and more benefits with free versions.	++
Oestreicher-Singer and Zalmanson (2013)	CONTENT OR COMMUNITY? A DIGITAL BUSINESS STRATEGY FOR CONTENT PROVIDERS IN THE SOCIAL AGE	MIS Quarterly	Subscription-based	Investigates whether willingness-to-pay in Freemium is affected by the level of participation inside a virtual community.	The level of participation is linked to users' willingness to pay for premium	+++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Ramaprasad and Bapna (2015)	Monetizing Freemium Communities: Does Paying for Premium increase Social Engagement?	Working paper	Subscription-based	Investigates whether conversion in Freemium leads to a higher level of participation inside a virtual community.	Free users, after converting to premium, listen to 287.2% more songs, create 1.92% more playlists, exhibit a 2.01% increase in the number of forum posts made, and gain 15.77% more friends. Premium users not only create value for themselves, but also for the community and site by adding more content and friends to the service.	++
Runge et al. (2016)	Freemium pricing: Evidence from a large-scale field experiment	ESMT Working Paper	Subscription-based	Researches the effect of giving too much away for free in the Freemium business model.	A reduction of share of free content increases conversion, but reduces usage Managers tend to give too much of their product away for free	+++
Schreiner et al. (2013)	On The Willingness To Pay For Privacy As A Freemium Model: First Empirical Evidence	Proceedings of the 21st European Conference on Information Systems (ECIS)	Subscription-based	Empirically determines the optimal price for a privacy protecting Freemium version of Facebook and Google. Tries to identify a willingness-to-pay for privacy.	The optimal price for a fictional, privacy protecting version of Facebook is 1.67 euro per month, while the optimal price for such a version of Google varied between 1.00 euro and 1.50 euro	+++

Author/s (Year)	Title	Journal/Source	Freemium Context	Research Focus	Main Findings	Relevancy
Schreiner and Hess (2015)	Why Are Consumers Willing to Pay for Privacy? An Application of the Privacy-freemium Model to Media Companies	ECIS	Subscription-based	Studies the motivators behind paying for privacy protection.	Perceived usefulness and trust affect the willingness to pay for privacy. Perceived internet privacy risk has no significant influence.	++
Shi et al. (2015)	From Minnows to Whales: An Empirical Study of Purchase Behavior in Freemium Social Games	International Journal of Electronic Commerce	Free-to-Play	Identifies and strategies in game design that lead to conversion in the F2P context.	The study presents various design and marketing strategies for F2P games	++
Voigt and Hinz (2016)	Making Digital Freemium Business Models a Success: Predicting Customers' Lifetime Value via Initial Purchase Information	Business and Information Systems Engineering	Free-to-Play	Studies how user behavior in Freemium affect customer lifetime value.	Users have higher future lifetime values if they (a) start buying in-game content early after downloading, (b) spend a high amount on their first purchase, and (c) use credit cards to purchase. Users often spend increasing amounts on subsequent in-game purchases.	+++
Wagner et al. (2013)	The advertising effect of free - Do free basic versions promote premium versions within the freemium business model of music services?	Proceedings of the Annual Hawaii International Conference on System Sciences	Subscription-based	Investigates whether the free version has an advertising effect on the premium version.	There is no advertising effect of the free version for premium	++



<b>Author/s (Year)</b>	<b>Title</b>	<b>Journal/Source</b>	<b>Freemium Context</b>	<b>Research Focus</b>	<b>Main Findings</b>	<b>Relevancy</b>
Wagner et al. (2014)	Converting freemium customers from free to premium the role of the perceived premium fit in the case of music as a service	Electronic Markets	Subscription-based	Researches the optimal premium fit in the context of a MAAS service.	Firms utilizing Freemium can increase the likelihood of conversion by providing a strong functional premium fit.	+++

## C Comparative Literature Table

Study	Research Focus				Context			
	Conversion	Retention	Referrals	Social	F2P	Subscription	Mobile App	Social Network
<b>This Study</b>	x	x	x	x	x	x	x	x
Appel et al. (2016)	x	x					x	
Bapna and Umyarov (2015)	x			x			x	x
Boudreau et al. (2017)	x			x				x
Cleghorn and Griffiths (2015)	x				x			
Deng et al. (2018)	x				x		x	
Hamari (2015)	x				x			
Hamari and Järvinen (2012)		x		x	x			
Hamari and Keronen (2017)	x				x			
Hamari and Lehdonvirta (2010)	x				x			
Hanner and Zarnekow (2015)	x			x	x			
Harvainen et al. (2018)	x				x			
Hsu and Lin (2016)		x		x			x	
Koch and Benlian (2017)	x							
Krause et al. (2014)	x					x		
Lambrecht and Misra (2017)	x					x		
Lee et al. (2013)			x			x		
Lee et al. (2017)			x			x		
Lehdonvirta et al. (2009)	x				x			
Mäntymäki and Islam (2015)	x			x		x		
Niemand et al. (2015)	x					x		
Oestreicher-Singer et al. (2013)	x					x		
Ramaprasad and Bapna (2015)				x		x		
Runge et al. (2016)	x					x		
Schreiner et al. (2013)	x							x
Schreiner and Hess (2015)								x
Shi et al. (2015)	x				x			
Voigt and Hinz (2016)				x	x			
Wagner et al. (2013)	x					x		
Wagner et al. (2014)	x					x		

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