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What factors influence termination behaviour on freemium platforms? An empirical analysis of the termination probability among paying users

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Abstract

Because of growing digitalization, consumers are confronted with more and more new technologies. Digital ecosystems and digital platforms are of great importance in this context. One possibility for monetizing the services offered on digital platforms is the freemium pricing model. In light of increasing competition, it is important for platform operators to know as much as possible about the usage behaviour of their consumers. In particular, they need to know what factors influence the termination behaviour of paying users. The empirical study is based on data from 20,319 paying users of a freemium platform that offers information on equestrian sports. Using a logistic regression, several possible influencing factors on the probability of termination are examined. Among other things, the study shows that the termination probability is greater if the paying user has chosen a shorter subscription. Users who have already terminated their subscription before their current one are also at greater risk of churn. Premium users with high levels of involvement and members who receive notifications about new content on the platform are less likely to quit. The number of video views is also negatively related to the termination probability. Freemium providers can use this information to predict terminations and take appropriate action, such as special offers for users at risk of termination.

1 | INTRODUCTION

The growing importance of digital ecosystems and digital platforms leads to the question of which forms of monetization are possible for providers. One possibility is the freemium business model (Mäntymäki et al., 2020; Wagner et al., 2014). Examples in practice are LinkedIn, Dropbox, or Spotify. The rising importance of such platforms is demonstrated, for example, by the strong increase in revenues from music streaming platforms. Global music streaming revenues have risen from 1 billion U.S. dollars to 17.5 billion U.S. dollars in the period from 2012 to 2022 (IFPI, 2023). The term

freemium is composed of 'free' and 'premium' and describes two different versions of a product (Osipov et al., 2015). Within the basic version, users receive the offered digital service free of charge; within the premium version, additional, exclusive services are available to users for a fee (Gu et al., 2018). Revenues are generated in particular from the subscriptions of premium users and from advertising (Osipov et al., 2015). In this context, continuous and predictable revenues are mainly generated by premium users (Gu et al., 2018). Another form of the freemium model for generating revenue is known in the games industry as 'free-to-play' (Hamari et al., 2020). In this case, additional paid features or add-ons are

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offered to the free service, which are sold to users as separate items (Ascarza et al., 2020).

For the present article, the first mentioned variant is of particular importance. In this case, the business model is mainly financed by the revenues from premium memberships. Since these revenues are significantly reduced by the termination of premium memberships, for operators of freemium platforms the analysis and influencing of termination behaviour can be a crucial factor for the success or failure of the business model. The specificity with regard to churn in freemium platforms is that churn can occur from the premium version to the free version of the same freemium provider (Gold, 2020). The losses caused by the churn of paying users to the basic version or to the competition cause freemium providers to focus on maintaining existing customer relationships instead of primarily trying to acquire new customers (García et al., 2017). The loss of sales due to churn can only be offset to a limited extent by the acquisition of new customers due to increasing competition (Albrecht & Baier, 2020). In addition, various studies show that the costs of acquiring new customers are significantly higher than the prevention costs to keep customers (Chan et al., 2022; Stauss & Friege, 1999).

The mentioned aspects indicate that freemium providers should try to forecast impending customer churn in order to be able to initiate preventive measures (Baesens, 2014). The reasons for the termination of a premium membership are often unclear and can be manifold (Mäntymäki et al., 2020; Wagner et al., 2014). On the one hand, the benefit of the subscription can omit. For example, this can happen due to the discontinuation of a corresponding activity. Here, from the perspective of the platform operators, there is hardly any possibility of influencing the users' decision. On the other hand, dissatisfaction with the offer or with the platform itself can be a reason for terminating the contract. In this scenario, effective influence on users can be achieved through the implementation of customer retention strategies (Lee et al., 2011). To influence customer retention or termination behaviour, it is essential to identify and empirically analyze the relevant influencing factors and causal relationships with the probability of termination.

An intensive evaluation of the existing literature on freemium models shows that many studies refer to online games without a contractual commitment (e.g., Ascarza et al., 2020; Hadiji et al., 2014; Ross, 2018). These are usually free-to-play games where revenue is generated via in-game purchases or advertising (Karmakar et al., 2022). In the studies on online games, churn or customer retention refers to the possibility of free play. Some of the factors examined are quite specific to online games, so they cannot be easily transferred to other areas. Contractual freemium models are examined less commonly. Examples are the studies by Mäntymäki et al. (2020), Hagen et al. (2021) and Brüggemann and Lehmann-Zschunke (2023). Hagen et al. (2021) focus on the impact of the premium version on retention and not on factors that may lead to the termination of premium membership. Brüggemann and Lehmann-Zschunke (2023) address the termination rate of premium memberships in a basic way with data aggregated to calendar weeks. Mäntymäki et al. (2020) show that the factors influencing the intention to upgrade are

completely different from those influencing the retention of a premium subscription. These differences indicate the importance of a more profound investigation of the factors influencing termination behaviour. It has not yet been identified which factors influence the termination probability of premium users. Among other things, these factors may relate to membership characteristics and consumer behaviour on the freemium platform. For freemium providers, it is very important to know these influencing factors to get a successful business model in the long term. Focused measures to retain users at risk of termination can only be taken if it is known which factors are related to the termination behaviour of paying users. The research gap identified will be filled by analyzing the following research questions.

1.1 | Research questions

What factors influence the termination probability of premium users of a freemium platform?

What factors indicate a lower risk of termination, what factors suggest that premium users are at risk of termination?

By answering the mentioned research questions, the state of knowledge on termination behaviour on freemium platforms is expanded. The results can support freemium providers in the context of termination prevention and customer retention. The purpose is to identify factors that indicate a possible termination in order to prevent it. For example, freemium providers could make special offers to users at risk of termination. To achieve this objective, after presenting the theoretical background as well as the literature review, hypotheses regarding the effect of possible influencing factors on the termination probability of premium users are derived. Subsequently, these hypotheses are empirically tested using a logistic regression analysis. For this purpose, an extensive real data set of a freemium platform is available, which offers users various information on sport and breeding horses.

2 | THEORETICAL BACKGROUND

2.1 | Theories on termination behaviour in freemium business models

To establish a freemium business model successfully in the market, it is crucial to generate revenue primarily through the paid premium version (Gu et al., 2018). A high number of terminations or the churn of premium users can threaten the existence of the entire business model and thus also the company. The Confirmation/Disconfirmation-Paradigm and the Prospect Theory can be used to explain termination behaviour. The Confirmation/Disconfirmation-Paradigm of Oliver (1980) states that the evaluation of satisfaction, for example with a service, is the result of a comparison process. According to this theory, people interpret information based on their existing opinions and expectations. Within the comparison process when making a purchase decision, the expectation is compared with the actual product

performance. If the perceived performance meets the customer's expectations, there is a confirmation. If the expectation and the performance do not match, this leads to a disconfirmation. Positive disconfirmation occurs when performance exceeds customer expectations (Oliver, 1980). If performance remains below expectations, negative disconfirmation results. This theory is supported by empirical studies (e.g., Bloemer & Dekker, 2007; Ho et al., 1997; Yoon & Kim, 2000). Positive disconfirmation increases customer satisfaction, whereas negative disconfirmation decreases satisfaction (Oliver, 1980). Following the Confirmation/Disconfirmation-Paradigm, consumers will terminate a service if the disconfirmation is negative. Negative disconfirmation thus has a negative impact on customer retention. Transferred to freemium platforms, this means that users consider the additional value of a premium subscription in order to evaluate the performance of the paid version. If the user's expectations are met or exceeded by the premium offer, this indicates confirmation or positive disconfirmation. In this case, the user will retain the premium membership. A termination occurs if there is a clear negative disconfirmation, that is, the additional service is below expectations.

'Kahneman and Tversky's Prospect Theory' describes why people do not always choose the variant with the greatest economic benefit when evaluating different options. In contrast to classical economic theory, it is assumed that people do not always act rationally, especially when making decisions under risk (Kahneman & Tversky, 1979). Instead, it is expected that people evaluate losses and gains differently. These valuations are not linear, but are influenced by emotional and subjective factors (Levy, 1992). Because of the emotional evaluation, losses are perceived much more strongly than gains of the same value. In terms of loss aversion, people in a winning situation tend to avoid risks. In contrast, however, they would take risks in order to avoid losses (Kahneman & Tversky, 1979). The approaches of Prospect Theory are also relevant for freemium business models. An important concept for researching freemium pricing models is the zero-price effect (e.g., Hüttel et al., 2018; Niemand et al., 2015; Niemand et al., 2019). This states that the customer tends to rate the value of a service higher if the price is zero, even if this service offers less performance than a paid version (Niemand et al., 2019). In the case of a freemium platform, the free basic version would therefore possibly be rated better than the paid premium version, even though the latter offers more.

Prospect Theory is relevant for the explanation of termination behaviour on freemium platforms as follows. When a customer decides to terminate the contract, they weigh up whether they want to continue using the benefits of the premium version and are therefore willing to pay the corresponding price. According to the Prospect Theory, it is assumed that the consumer perceives losses more intensely than gains. If the user is now faced with the decision of whether to terminate the premium version and switch to the free version, they will evaluate the potential gains against the losses. In the sense of loss aversion, the consumer could estimate the financial loss for the premium version to be higher than the gain in the form of the functional benefits of this version. In this case, the premium user would terminate the contract and return to the free version.

2.2 | Literature review on freemium business models

In the following, relevant literature on freemium business models is presented. In addition, the present study is placed in the research field and distinguished from existing articles. Looking at the literature on freemium applications, three major research strands appear: implementation of a freemium strategy, conversion of basic users into premium users and customer retention and churn. These three research strands are explained below.

2.2.1 | Implementation of a freemium strategy

There are many studies that deal with the successful implementation of a freemium pricing strategy. In this context, the differences in quality between the free version and the premium version and the pricing for the premium version are considered (e.g., Bourreau & Lethiais, 2007; Hamari et al., 2017; Holm & Günzel-Jensen, 2017; Niemand et al., 2019; Runge et al., 2022). In terms of pricing, for example, Runge et al. (2022) find no evidence of negative effects on quality as a result of price variations. Other studies, such as Rietveld (2018), compare freemium models with premium models. Regarding online games, he shows that freemium games are played less and generate less revenue compared with premium games.

2.2.2 | Conversion of basic users into premium users

The second research strand on freemium models focuses on how basic users become premium users. The authors of several publications analyze factors that influence the conversion of basic users into premium users (e.g., Pauwels & Weiss, 2008; Li & Cheng, 2014; Wagner et al., 2014; Mäntymäki & Islam, 2015; Koch & Benlian, 2017; Sifa et al., 2018; Hamari et al., 2020). The conversion rate is significantly higher when starting with a trial free premium version compared with starting with a free (basic) version. This effect is stronger if the premium and free versions are similar (Koch & Benlian, 2017). Hamari et al. (2020) show a negative correlation between the enjoyment of the freemium service and the intention to purchase premium content. Moreover, freemium usage is positively influenced by the quality of the freemium service. However, this does not appear to lead to more premium purchases.

2.2.3 | Customer retention and churn

The third research strand concerns increasing customer retention and predicting churn. The present study can be classified in this research field. To delimit this study, the topic and key findings of selected studies in the research strand are presented below.

Hadiji et al. (2014) address the prediction of player churn in freemium games. The study shows that behavioural features, such as play

time, session time and intersession time, can be used in predicting churn in games. In addition, the number of sessions, the number of days, the average time between sessions and the current absence time are important characteristics for predicting player churn. Voigt and Hinz (2016) examine payment data from approximately 57,000 customers of three non-contractual freemium business models to predict customers' lifetime value in freemium business models. They show that customers have higher future lifetime values if they make a purchase early after registration, spend a significant amount on their first purchase and use credit cards. Ross (2018) looks at different customer retention measures and the relationship between customer retention and monetization in freemium games. Using data from 51 freemium mobile video games, he shows that the relationship between customer retention and future monetization is positive.

Banerjee et al. (2019) address the prediction of user activity, engagement and churn in freemium games with player level gaming information from 38,860 players. They find that user activity increases on weekends and through in-app purchases. Players who do not visit the game often and players who spend more of their virtual currency have a high probability of dropping out at a later time. Ascarza et al. (2020) examine customer retention and monetization in freemium games in their study. A field experiment with 329,999 users of a free-to-play game shows that reducing game difficulty among customers at risk of churning increases engagement, retention and customer spending for premium services. Using survey data from 436 users of an online music service, Mäntymäki et al. (2020) explore differences between basic and premium users in terms of different values that influence basic users' decision to upgrade and premium users' decision to retain their subscriptions. The user values that drive upgrade intent are completely different from those that drive premium subscription retention. The intention to retain the premium subscription is determined by discovery of new content and ubiquity; enjoyment and price value have no influence.

Using data from 12,000 users of a freemium mobile fitness application, Hagen et al. (2021) address the impact of adopting a premium version on user engagement and retention in a freemium business model. Premium membership is shown to improve user engagement and retention. Karmakar et al. (2022) use data from 15,000 players to develop a framework for predicting retention in freemium games by jointly modelling players' motivation, progression and churn. Selected results are that players with a male character have a greater probability of dropout than female characters. Players with high achievement and more collaborative players are less likely to exit. Brüggemann and Lehmann-Zschunke (2023) address the question of how terminations can be reduced in freemium business models. For this purpose, data aggregated to calendar weeks of premium users of an online platform with a contractual freemium business model are analyzed. The study shows that increasing user involvement and increasing platform-specific content reduce the termination rate. In addition, freemium providers should pay special attention to the interaction of video views and the number of last logins. The higher both the number of video views and the number of last logins in a week, the higher the termination rate in that week.

The literature review shows that many studies refer to online games (e.g., Ascarza et al., 2020; Hadiji et al., 2014; Ross, 2018). These are usually free-to-play games without subscriptions or contracts (Karmakar et al., 2022). A contractual freemium model is studied by Mäntymäki et al. (2020). They show that the values that are crucial for the upgrade intention are completely different from those that are crucial for retaining a premium subscription. However, their results are based only on survey data. The differences identified point to the importance of a more in-depth examination of factors influencing the termination behaviour, which is the aim of this study. Even Hagen et al. (2021) consider a freemium model with subscriptions. However, they focus on the impact of the premium version on engagement and retention and not on factors that may lead to premium membership termination. They therefore have a different viewpoint than this research. Brüggemann and Lehmann-Zschunke (2023) do examine factors related to premium membership termination rates, but only in a fundamental way with data aggregated to calendar weeks. In the limitations, the authors point out that an individual forecast of the termination probability per premium user is not possible on the basis of this aggregated data. They recommend a closer look at the individual user level in further research. This is precisely where the following empirical analysis takes off.

The present study targets to close the research gap with a comprehensive real data set. The aim is to identify fundamental factors influencing the termination probability of premium users. Various influencing factors are examined, which relate to membership as well as user engagement and activity.

3 | HYPOTHESES DEVELOPMENT AND RESEARCH MODEL

In order to answer the research questions—What factors influence the termination probability of premium users of a freemium platform? What factors indicate a lower risk of termination and what factors suggest that premium users are at risk of termination?—Hypotheses on the effect direction of the possible influencing factors are derived below.

Possible factors influencing the termination probability of premium users of a freemium platform can concern different characteristics of membership and usage. Based on this, they can be classified into different categories: membership, involvement and activity. With regard to membership factors, the first point to mention is the time of registration. It can be assumed that the probability of termination of the premium membership is related to how long a user has been registered on the freemium platform. In the context of free-to-play games, various authors have been able to demonstrate that continuous use, that is, use over a longer period of time, of the freemium service is a crucial criterion for the purchase of premium content (Hamari et al., 2020; Hanner & Zarnekow, 2015). Transferred to contractual freemium models, it is assumed that the longer a user has already been registered on the freemium platform, the less likely they are to terminate their premium membership.

For the customer's decision to subscribe to a premium version or to use it for a further period, the expected risk is of importance, similar to the decision to purchase physical goods (on the correlation between expected risk and purchasing decisions, see e.g., Ariffin et al., 2018; Kaplan et al., 1974). With regard to the premium version of a freemium platform, it can be assumed that the user's expected risk increases the greater the length of the subscription, as the total amount to be paid is generally higher, even with, for example, lower monthly fees. Various studies on subscriptions have already demonstrated that the expected risk has a strong negative influence on the attitude towards the offer (e.g., Bischof et al., 2020; Roy & Ortiz, 2023). Considering the Confirmation/Disconfirmation-Paradigm of Oliver (1980), users will terminate a premium membership if the disconfirmation is negative, that is, when the services are below their expectations. If the user is not yet sure whether the premium version meets their expectations, a shorter subscription period is advantageous for them. Based on the mentioned aspects, it is expected that the termination probability of the premium membership is higher with a shorter subscription period than with a longer one.

Another connection can be assumed between the payment method and the probability of termination. If the premium membership is paid by bank transfer, the user will immediately see the financial outlay in comparison to direct debit. Even with a continued membership, the user must be active in each period to pay the amount. In the case of a direct debit, the amount is debited in each period without the active involvement of the user. Prospect Theory states that customers perceive losses more strongly than gains (Kahneman & Tversky, 1979). If the financial loss for a user becomes clear when the amount is transferred, the trade-off between cost and benefit may be to the disadvantage of the premium membership. In addition, it can be presumed that users who are still unsure about their premium membership or have little trust in the platform provider are more likely to opt for credit card payment rather than direct debit. Hence, it is assumed that the probability of termination is greater when payments are made via bank transfer or credit card compared with payments made through direct debit.

Another factor concerning membership is the booking type. A distinction can be made between a new booking and a continuous booking. A new booking means that a user was not yet a premium member in the previous subscription period. The situation is different with a continuous booking. In this case, the user was already a premium member in the previous subscription period. If there is no termination, the subscription remains active for the current period. In the case of continuous membership, the user is presumably satisfied with the functions of the premium version, so that stronger customer retention and a lower probability of termination can be assumed. The importance of customer retention for monetization in the context of freemium business models has already been demonstrated in various studies (e.g., Ascarza et al., 2020; Ross, 2018). Conversely, it is presumed that the probability of termination of a premium membership is greater for a new booking than for a continuous booking. This effect can be intensified if a user has already used the premium version before the new booking in the past and terminated it. In this case,

their expectations of the premium version have probably not been met, so there is a risk that their expectations will again not be met when a new booking is made. This leads to the assumption that the probability of termination is greater if the premium membership was booked again at a later point in time after a termination, as opposed to when the premium membership is initially subscribed to. For the factors that influence the membership of premium users, the following hypotheses are summarized:

H1a. The longer a user has been registered on the freemium platform, the less the probability of termination.

H1b. If a user decides on a shorter subscription period, the probability of termination is greater than with a longer one.

H1c. If payment is made by bank transfer or credit card, the probability of termination is greater than if payment is made by direct debit.

H1d. If it is a new booking of the premium membership, the probability of termination is greater than for a continuous premium membership.

H1e. If the premium membership was booked again at a later point in time after a termination, the probability for a termination is greater than for a first-time booking.

In addition to the membership factors presented above, another category of factors that should be mentioned is those related to user involvement. In the context of freemium business models, the involvement of users can have an influence (Gainsbury et al., 2016). A user's involvement can be seen as an indicator of their personal interest as well as the perceived relevance of the premium version content (Niemand et al., 2015). With regard to customer retention, involvement can be seen as an emotional retention factor. A positive influence of user involvement has been determined in previous research, for example, with a view to satisfaction with the premium offer (McDonald, 2010). Oestreicher-Singer and Zalmanson (2013) found in their study that the willingness to pay for premium services is strongly associated with the engagement in the community. Conversely, it can be assumed that if the user's engagement or involvement is high, the probability of termination is lower. A high involvement can be shown, for example, by the interest in information sent regularly per e-mail by the freemium provider. In addition, the study by Karmakar et al. (2022) points to the importance of user engagement for customer retention in freemium models. Looking at online games, they show that changes in a player's engagements are highly significant in predicting potential termination (Karmakar et al., 2022). Brüggemann and Lehmann-Zschunke (2023) also point out the importance of user involvement with regard to the termination rate of paying users. A high level of engagement and involvement can be assumed if the users are strongly affected by the content of the platform. This is the

case, for example, when a premium member has a strong connection to the content of the freemium platform or if there are many videos in which they can be seen themselves. Thus, this study includes the number of videos assigned to the profile of a premium member as an indicator of user involvement. The mentioned points lead to the following hypotheses.

H2a. If a premium member has subscribed to the newsletter and agreed to notifications via e-mail, the probability of termination is lower.

H2b. The stronger the personal connection to the content of the freemium platform, the lower the probability of termination.

H2c. The more videos are assigned to the profile of a premium member, the lower the probability of termination.

The third category relates to user activity factors. An important incentive for the further booking of a premium version is the use of the content available only in this version (Kim & Kim, 2020; Mäntymäki et al., 2020). The platform operator is faced with the challenge of creating a tempting free offer to attract users and at the same time designing the premium version in such a way that users have an incentive to book or continue using the paid version (Holm & Günzel-Jensen, 2017). To benefit from a premium membership, users must actively use the platform's premium content. In the literature, attention has been drawn to the relevance of user activity, for example, in the context of online freemium games and music platforms with a freemium approach (Banerjee et al., 2019; Yu et al., 2017). Looking at a music platform, Bapna et al. (2018) found that users who converted to a premium membership were significantly more active, for example, listening to more songs and creating more playlists. In their study of user activity in freemium online strategy games, Rothmeier et al. (2021) point out the importance of activity in predicting user churn. The more active and motivated the players are, the less likely they are to terminate. With this in mind, the empirical analysis considers the number of profile edits, the number of profile visits and the number of video views as indicators of premium user activity. With regard to these influencing factors, the following hypotheses are derived.

H3a. The more profiles edited by a premium member, the lower the probability of termination.

H3b. The more profiles visited by a premium member, the lower the probability of termination.

H3c. The more videos viewed by a premium member, the lower the probability of termination.

Figure 1 graphically illustrates the research model along with the hypotheses derived.

4 | DATA AND METHOD

The object of the study is an online platform that provides users with various information on sport and breeding horses. The information includes horse pedigrees, horse show results and videos of sporting and breeding events. The platform has a freemium model, that is, it can only be used to a limited extent without a paid subscription. Only premium users get full access to all the information provided. Users can assign horses to their profiles if they are riders, owners or breeders of the horses. If the users themselves take part in horse shows, their profiles contain show results and videos of their starts. Premium membership is required to view these results and videos. Furthermore, premium members can view the results and videos of all sporting and breeding events.

The data on the freemium platform was gathered for the period from February 2015 to March 2021. To ensure the most accurate analysis of factors influencing the termination probability, a specific time-frame (2018–2019) was selected from this database during which neither a price increase nor restrictions related to the Corona pandemic were in effect. This approach was chosen because a price increase can strongly influence the willingness to terminate the subscription. Because of the Corona pandemic, many events could not take place, so that less new content could be made available on the platform during this period. This can also lead to a strong decrease in the benefit of the platform for premium members. The underlying data set includes information on premium members whose subscription started in 2018. In total, there are 20,319 premium members. In all cases, it is known whether the current subscription was terminated or retained. As all Premium memberships under review began in 2018 and cover a maximum of 12 months, terminations up to the end of 2019 were recorded. In addition, further information is available on membership, the involvement of premium members and their activity in the observation period. Table 1 provides a description of the dependent and independent variables as well as their descriptive statistics.

The descriptive statistics show that 16% of premium users terminated their membership during the observation period. In terms of subscription length, a larger proportion of users opted for a 12-month subscription. Similarly, a large proportion of premium members agreed to direct debit for payment. It is striking that only 27% of bookings are continuous memberships. In terms of customer retention, the freemium provider should try to increase this value. A total of 63% of premium members have signed up for the newsletter and agreed to receive notifications (e.g., about new videos). Regarding the horses assigned to premium users, a wide scattering can be observed. The maximum is 118, but the mean value of 0.53 indicates that only a few members have so many horses assigned to them. The variable 'Assigned videos' also shows a large scatter with a minimum of 0 videos and a maximum of 836 videos. On average, premium members are assigned 11.03 videos featuring either themselves or one of their horses. With regard to the independent variables on user activity, the descriptive analysis shows that, on average, 1.47 profiles were edited, 72.12 profiles were visited and 79.50 videos were viewed by the premium members during the observation period.

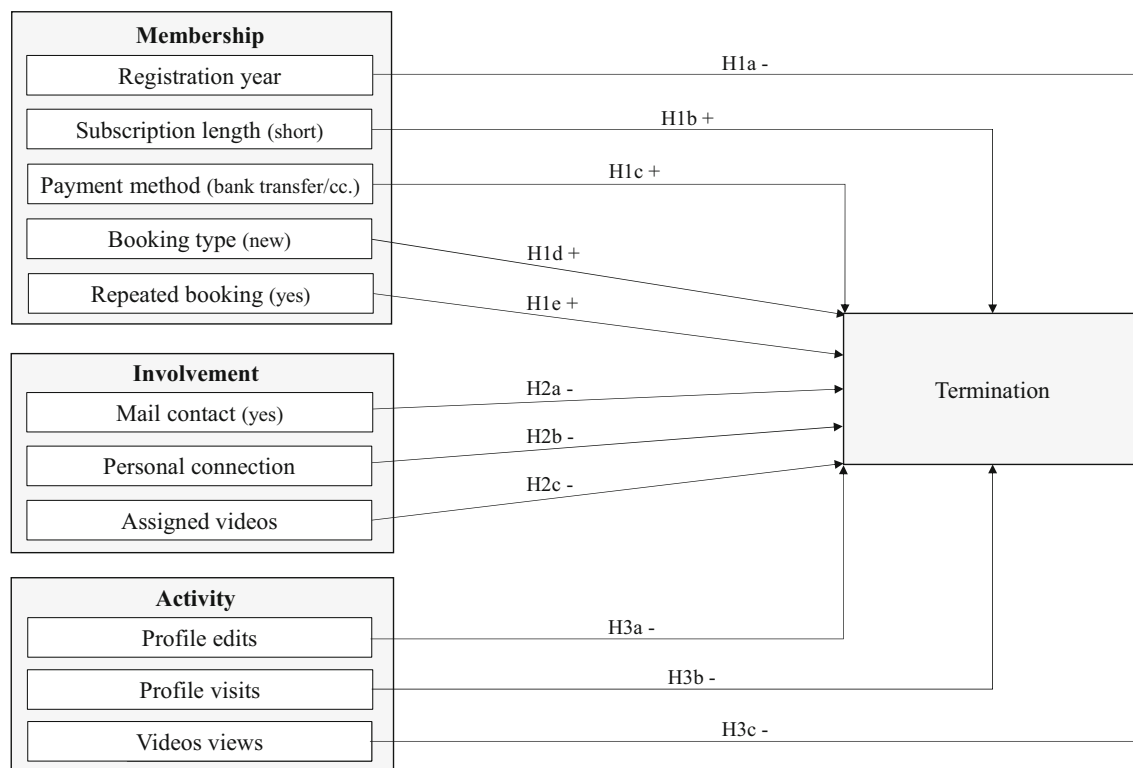


FIGURE 1 Research model. For the binary independent variables, the meaning of the value 1 is given in brackets.

For the following empirical analysis, logistic regression is used as the method. Unlike linear regression, it is suitable for examining relationships with nominally scaled dependent variables (DeMaris, 1995). In the present empirical study, the termination of the premium membership is used as the dependent variable. Since the dependent variable is a binary coded variable, binary logistic regression is the suitable procedure. The preconditions for this method are briefly described below and examined in terms of the research model.

To use logistic regression, some conditions must be met. Specific distributional assumptions are not necessary for logistic regression, but a sufficient sample size is required. For meaningful results the sample size should be at least 100 observations (Urban, 1993). The data set meets sample size requirements with 20,319 observations. Furthermore, there should be no high correlations between the independent variables (multicollinearity) and possible outliers should be identified to prevent distorted estimates (Çokluk, 2010). The detection of outliers on the basis of studentized residuals did not provide any indication of potential outliers. The premise that the independent variables should be free of multicollinearity is mostly satisfied in the research model. However, there is a high correlation (Pearson correlation coefficient: 0.646) between the variables 'Profile visits' and 'Video views'. This strong correlation can be explained by the fact that videos are frequently clicked on the profile pages. For example, a premium member visits a profile and finds interesting videos there, which the member then views. For the empirical analysis, it was decided to include the variable 'Video views', since profiles can also be visited by basic members, but not all content is unlocked for them, such as the videos.

5 | RESULTS AND DISCUSSION

In the following, the results of the logistic regression are presented per derived hypothesis. The likelihood ratio test, the pseudo R -squared by Cox and Snell and the pseudo R -squared by Nagelkerke are used to test the overall model for goodness. SPSS offers the omnibus test of model coefficients, a special case of the likelihood ratio test. The highly significant result of this test ($\chi^2(10) = 2008.44$; $p < 0.001$) indicates that the independent variables are relevant to separate the groups. The values of the pseudo R -squared statistics (Cox and Snell- $R^2 = 0.094$; Nagelkerke- $R^2 = 0.162$) indicate a satisfactory goodness of fit. To test the robustness of the model, bootstrapping was performed. This does not show any significant changes in the results.

Table 2 shows the results of the logistic regression analysis. The table includes the estimated regression coefficients (b_j), the standard errors, the values of the Wald test, the odds ratios (e^{b_j}) and their 95% confidence intervals.

The Wald test shows mainly large values and small significance levels ($p < 0.001$). An exception is the coefficient of the variable 'Booking type', which is not significant. The coefficient of the variable 'Profile edits' is also not significant. The coefficient of the variable 'Personal connection' is significant only at the 0.1 level. For the remaining independent variables, the Wald test indicates that the variables are highly relevant to separate the groups. Furthermore, very small standard errors are observed regarding the independent variables. With respect to the 95% confidence intervals, the direction of

TABLE 1 Description and descriptive statistics of the variables.

Variable	Description	Mean	Minimum	Maximum
Dependent variable				
Termination	Indication of whether a premium member has terminated (1 = termination; 0 = no termination).	0.16	0	1
Independent variables on membership				
Registration year	Year in which the premium member registered on the platform (also possible as a basic member)	2014.71	2011	2018
Subscription length	The subscription period of the premium membership can be 6 or 12 months (1 = 6 months; 0 = 12 months)	0.24	0	1
Payment method	The payment can be made by credit card/bank transfer or with direct debit (1 = credit card/bank transfer; 0 = direct debit)	0.13	0	1
Booking type	Distinction between new booking and continuous membership (1 = new; 0 = continuous)	0.73	0	1
Repeated booking	Premium membership was newly booked after a termination (1 = yes/0 = no)	0.08	0	1
Independent variables on involvement				
Mail contact	The premium member has agreed to the newsletter and notifications (1 = yes/0 = no)	0.63	0	1
Personal connection	Number of horses assigned to the profile of a premium member (the user is the breeder, rider or owner of these horses)	0.53	0	118
Assigned videos	Number of videos assigned to the profile of a premium member	11.03	0	836
Independent variables on activity				
Profile edits	Indication of how many profiles have been edited by the premium member	1.47	0	900
Profile visits	Number of profiles visited by the premium member	72.12	0	16,518
Videos views	Number of videos viewed by the premium member	79.50	0	4379

TABLE 2 Results of the logistic regression analysis.

Variable	b_j	Standard error	Wald test	e^{b_j}	95% confidence interval	
					Lower limit	Upper limit
Independent variables on membership						
Registration year	0.128	0.011	134.644**	1.137	1.112	1.162
Subscription length (1 = 6 month)	0.777	0.044	317.989**	2.175	1.997	2.368
Payment method (1 = bank transfer/cc.)	−0.453	0.071	40.349**	0.636	0.553	0.731
Booking type (1 = new)	0.001	0.054	0.000 ^{n.s.}	1.001	0.900	1.112
Repeated booking (1 = yes)	0.890	0.069	164.452**	2.436	2.126	2.791
Independent variables on involvement						
Mail contact (1 = yes)	−0.492	0.042	136.024**	0.612	0.563	0.664
Personal connection	−0.099	0.061	2.647*	0.906	0.804	1.020
Assigned videos	−0.152	0.020	55.428**	0.859	0.825	0.894
Independent variables on activity						
Profile edits	−0.051	0.038	1.791 ^{n.s.}	0.950	0.882	1.024
Videos views	−0.325	0.013	649.602**	0.723	0.705	0.741
Intercept	−285.893	22.270	135.146**	0.000	-	-

Abbreviation: n.s., not significant.

*Significant at the 0.1 level.

**Significant at the 0.001 level.

the influence of an independent variable is considered certain if both interval limits are either below or above one. This condition is met for all independent variables except for the variables 'Booking type', 'Personal connection' and 'Profile edits'. The direction of the influence cannot be determined with certainty for the variables mentioned. In the following, the results of the logistic regression are interpreted using the odds ratios.

Looking at the independent variables on membership, the results support three of the five hypotheses derived. As expected, the longer a user has been registered on the freemium platform, the less the probability of termination (H1a). However, the odds ratio of 1.137 is quite close to 1, so that the correlation between this factor and the probability of termination is rather weak. The results show a much stronger influence with regard to the variable 'Subscription length' ($e^b = 2.175$). It can be concluded that the probability of termination is significantly greater for a subscription length of 6 months than for a subscription length of 12 months. H1b is thus supported. For providers of freemium platforms, this means that uncertain customers initially choose a shorter membership and that they should be given greater consideration with regard to possible termination. Contrary to expectations, the probability of termination is less if payment is made by bank transfer or credit card instead of direct debit ($e^b = 0.636$). Hypothesis H1c must therefore be rejected. When interpreting this result, however, it must be considered that a large proportion of premium memberships are paid by direct debit (87%). Moreover, this result is consistent with the findings of Voigt and Hinz (2016), who determined that customers have a higher future lifetime value when they use credit cards for payment. Hypothesis H1d must also be rejected. In this case, the logistic regression result is not significant. Thus, no influence of the booking type (new or continuous) on the probability of termination could be demonstrated. It is different if a user has already used the premium version in the past before the new booking and has terminated it. The probability of termination is higher if the premium membership was booked again at a later time after termination than if the premium membership was booked for the first time (H1e). With an odds ratio of 2.436, the variable "Repeated booking" has a strong influence on the dependent variable. Premium members who have already terminated their premium membership in the past before their new booking can therefore be considered as unsafe in terms of customer retention. Freemium providers should try to avoid threatened terminations of these members with customer retention measures.

With a view to the independent variables on user involvement, the empirical results support two of the three hypotheses derived. Hypothesis H2b must be rejected because the 95% confidence intervals indicate that the direction of the influence of the variable 'Personal connection' cannot be considered as certain. A strong negative relation exists between the variable 'Mail contact' and the probability of termination ($e^b = 0.612$). If a premium member has signed up for the newsletter and agreed to notifications via email, the probability of termination is less (H2a). From the provider's point of view, it therefore makes sense to establish direct contact with as many users as possible. The probability of termination is also lower the more

videos are assigned to the profile of a premium member ($e^b = 0.859$). Thus, hypothesis H2c is supported. If there are many videos featuring the member or their horses, termination of the premium membership is less likely to occur.

Regarding the hypotheses on activity, one hypothesis (H3b) could not be tested because the variable 'Profile visits' had to be excluded from the logistic regression analysis due to multicollinearity. The hypothesis (H3a) that the more profiles are edited by a premium member, the lower the probability of termination cannot be confirmed. There is no significant relationship between the variable 'Profile edits' and the probability of termination. The 95% confidence intervals also show that the direction of the influence of the variable 'Profile edits' is not certain. One potential explanation is that it is also possible for non-paying users to edit profiles. So, it is not a special functionality of the premium version. In comparison, there is a rather strong negative relationship between the number of video views and the probability of termination ($e^b = 0.723$). The more videos viewed by a premium member, the lower the probability of termination. Thus, the empirical analysis supports hypothesis H3c. A high level of activity is beneficial for customer retention in this context.

6 | CONCLUSION

6.1 | Theoretical and managerial implications

The results of this study provide valuable and new insights for both academics and practitioners with regard to the termination of paying users of freemium platforms. By testing the theory-based hypotheses, results were obtained that contribute to a better understanding of the probability of termination. Within previous research on freemium models, many studies have focused on online games without contractual commitments (e.g., Ascarza et al., 2020; Hadiji et al., 2014; Ross, 2018). In comparison, other influencing factors are significant for contractual freemium models, such as the length of the subscription or the booking type. Contractual freemium models have already been considered, but not with regard to various factors influencing the termination probability of premium members (e.g., Brüggemann & Lehmann-Zschunke, 2023; Hagen et al., 2021; Mäntymäki et al., 2020).

The influencing factors identified in this study contribute to an expansion of the theoretical basis on freemium business models. In addition, it is very important for freemium providers to know these influencing factors to be successful with their business model in the long term. The factors influencing the termination probability of premium members relate to various membership characteristics as well as user involvement and activity. With regard to membership, the year of registration, the length of the subscription, the payment method and repeated booking were shown to be relevant factors influencing the probability of termination. Freemium providers should pay particular attention to users who have chosen a shorter subscription length and users who have already terminated a premium membership in the past before the new booking. Both

factors are positively related to the probability of termination. Uncertain users usually choose a shorter contract term first. In the second case, members have been dissatisfied with the premium version in the past or there was no need to use it anymore. Freemium operators can use this information to forecast potential terminations and respond with customer retention measures. For example, it would be conceivable to offer an extension of the subscription with a shorter term and a reduced price.

In terms of user involvement, the mail contact and the number of assigned videos are negatively related to the termination probability of a premium member. Freemium platform providers should try to get as many users as possible to sign up for the newsletter and agree to receive notifications about new content from the platform via email. They can also try to increase the involvement of their premium users through specific offers (e.g., contests or rankings). Moreover, individualization of user accounts is also conceivable, for example, through an individual avatar. Looking at user activity, a high number of videos viewed has a negative impact on the probability of termination. Very active users are thus less likely to churn. To keep paying users at a high level of activity in the long term, it is important to regularly update the platform-specific content and expand it accordingly.

6.2 | Limitations and further research

Even though the results of the study provide new insights into factors influencing the probability of premium users terminating their contracts, the study also has limitations. For instance, the empirical results are based on data from a single online platform. Although a transfer of the results is obvious, it should nevertheless be verified with further data from different industries. The exclusive focus on a single freemium platform limits the scope of potential influencing factors that can be considered. In particular, factors relating to personal reasons for a termination of the membership are not covered by the data set. Future research approaches could try to add other possible influencing factors. In addition, differentiation according to various user groups could also provide relevant results in the future. For instance, it is conceivable to differentiate between commercial and private users, as their activity levels can vary significantly.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Company. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of Company.

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