Original Article

The impact of social network-based segmentation on customer loyalty in the telecommunication industry

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ABSTRACT Social contacts are an essential part of everyone's life. With today's mass of advertisements on every thinkable media, people get overloaded with product information. Considering the variety of offers, it is hard to get an overview and is extremely time-consuming to find an appropriate product. In this media-dominated world, we tend to go back to the very simplest form of getting trusted information by asking friends for recommendations and advice. To follow this trend, marketing strategies need to incorporate this trend. A possible consequence is to identify social networks and integrate the additional information into Customer Relationship Management (CRM). Social network analysis provides basics to describe these networks, but how can they be used to increase customer loyalty and therewith increase profit? Telecommunication is probably the most important method of communication in today's globalised world. Using social media while on the go has become as normal as reviewing emails during a train ride. As communication is an essential part of keeping contact with our social ties, telecommunication service providers must have attractive options to incorporate social networks into their marketing strategies. Because of the saturated telecommunication market, customer retention has become one of the key strategies in this industry. Considering trends in today's international telecommunication market, customer segmentation has been identified as the key to successfully using social network analysis in CRM. In this article, we propose a social network-based segmentation to identify strongly connected customers with high influence on their social network. This approach enhanced with churn predictive modelling techniques is a powerful instrument to prevent churn. Using these methods in a loyalty project at a mobile telecommunication company we achieved impressive results. We provide empirical evidence that loyalty programmes based on

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social networks can decrease churn und increase revenue at the same time. We applied the proposed method to define the right pricing model and the appropriate usage of social media. Our aim was to accumulate social communities on a single provider by giving the right incentives to customers with high social influence.

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INTRODUCTION

Telecommunication has become a substantial part of the modern, rapidly changing world. Standards have been established and technologies leveraged all over the world. As a result, technology is no longer a key factor for customer retention. Additional factors need to be considered to gain advantages and successfully maintain a sustainable customer base through efficient retention management.

Although mobile cellular growth is declining on a global scale, it is not unusual for subscription rates to reach 116 per 100 inhabitants in the developed parts of the world, that is, a massively saturated market situation. At the same time, the mobile market in the developing world increased its share of mobile subscriptions from 53 per cent in 2005 to 73 per cent in 2010.¹

Strong competition, saturated markets and increasing acquisition costs make the ability to retain customers crucial for enterprise profitability. There is empirical evidence based on recent work that analysing the social interactions of the customer can improve the accuracy of churn prediction. However, not all customers have the same value. Customer lifetime value models provide a useful way to identify the most valuable customers based on cash flow and loyalty.²

A unique characteristic of this industry is the level of available information for data analysis. The call detail record (CDR) provides information about each individual call and therewith provides details about the social network of each customer.

Although social network analysis has existed for over 30 years, it appears that it has not been used as a substantial element of Customer Relationship Management (CRM) so far. Because of the focus on personal relations, this theory might have significant potential to revolutionize today's CRM and marketing methods.

IMPACT OF SOCIAL NETWORKS

Interest in social networks has grown rapidly over the past 30 years. Not only has it become an academic topic, but also well known by the public since the first social media platforms such as MySpace and Facebook became famous. With its popularity, social science publications have increased during the past three decades (p. 1).³

A social network is a structure where a set of actors are connected by one or more relations. This is common to most network definitions. Different types of relations define different types of networks. In the same office, the advice-seeking network can differ from the friendship network. It is not necessary that all actors are connected to each other. In fact, sometimes only a few dyadic relations occur. Social network analysis takes both into account, the present and the absent connections and also the strength of the relations (p. 8).³

Social network analysis has become the key paradigm in sociology, technology and information science. An attribute of

an individual in a network has become less important than the relationships with other individuals in the network (p. 1).⁴ Understanding the nature and strength of these relations can help to explain and predict customer behaviour and therewith can be a powerful instrument for CRM. Considering social networks provides valuable information about customers and in turn allows marketing campaigns to be more precisely evaluated and designed.

Customer orientation has become the key success factor in competitive markets of developed countries. We strongly believe that using social networks for analysing customer behaviour can lead to a competitive advantage. Social network analysis allows for the creation of additional incentives for customers that can improve campaign targeting, resulting in sustainable customer loyalty.

CUSTOMER SEGMENTATION

Portfolio analysis

Social network analysis can optimise campaign targeting by focusing on customers with a strong impact on their social network. For the evaluation of a customer's social network, information about the individual social connections needs to be available. In the telecommunication industry, CDRs can be used to evaluate the social network of a customer.

Homogenous groups can be defined by grouping customers with similar attributes. By choosing specific dimensions, the focus of a portfolio can be defined. We decided to group the customer base by level of connectivity and social network size. The main goal is to identify leaders with a strong impact on their network. The primary connections of a customer define the immediate impact on his social network. Therefore, only considering these primary relationships appears to be an efficient approach.

Level of connectivity (C)

The number of calls and different connections has a positive correlation. To eliminate the correlation and standardise the data, the number of total calls is divided by the number of different connections. The result is the average number of calls a customer has with a social tie.

$$C_c = \frac{\sum_{t=1}^n i_t + o_t}{\sum_{t=1}^n d_t}$$

where C = level of connectivity;
 c = customer; i = incoming calls; o = outgoing calls; d = different connections; and t = time period.

Social network size (S)

The social network size can be calculated by counting the number of linked caller IDs. Each caller ID is counted only once to calculate the social network size. Intensity or frequency is considered for the level of connectivity.

Using the call graph in Figure 1, we can now calculate and analyse the impact of Customer A and B on their individual network.

$$S_A = 3 \quad C_A = \frac{12}{3} = 4$$

$$S_B = 5 \quad C_B = \frac{100}{5} = 20$$

Comparing the figures of the two customers directly, we learn that there is a significant difference between C_A and C_B . Related analysis shows that Customer B is more connected with his network than Customer A. Consequently, it can be assumed that B has a more significant impact on his social network. A social network-based portfolio helps to compare more than just the two of them, and shows how individual customers are positioned compared with the whole customer base.

Figure 1: Call graph.

Figure 2: Social network portfolio.

Using the dimensions Level of Connectivity and Social Network Size (see Figure 2) we identified the following segments:

Networker

These customers have a wide network with solid connections. This makes them social leaders with a strong influence on their social network. They should therefore be strongly considered for retention and cross-/upselling campaigns. With this concept, a wide network can be indirectly reached by only contacting a single customer.

Leader positions in any community tend to be networkers. These can be society leaders, political leaders and company leaders, but also trendsetters and role models.

Connector

Customers in this segment have strong connections with fewer social contacts. The core network is restricted to a limited

number of members. Although the network is not as large as that of a networker, these customers still have a strong influence on their network. This also makes them promising contacts for campaign targeting.

Family-orientated communities tend to have a network structure with a connector as a key node. Small societies with specific purposes may also have this structure.

Politician

Being in contact with a myriad of people describes the nature of these customers. Although they have a large network, the level of connectivity is weak. As a result, the level of influence is also low.

A typical example is politicians. Owing to the nature of their business, salespersons also tend to have such a network structure.

Robinson

This segment of customers is rather uninteresting from a social network analysis perspective. Usage of service is generally low, which makes it hard to clearly categorise them. Therefore, to properly identify a subset of customers for campaigns in this segment, the standard retention or cross-/upselling target selection methods are better used.

Reasons for the pure use of service are not easy to identify. It could be that the service is only used in emergencies or, more possibly, the customer focuses on the use of additional services, for example, data or text messages.

The portfolio analysis confirmed that Customer A has a rather loose connection with his network, whereas Customer B has a much stronger connection. Although both customers have a small network, Customer B should definitely be considered for campaigns as they have a stronger impact on their network.

By only focusing on social networks, this analysis might look a bit single-sided. Considering the fact that the level of connectivity is defined by the number of

calls, there must be a direct correlation between level of connectivity and revenue. The level of impact might differ according to the individual contract of a customer, but this does not affect the fact that there is a positive correlation.

Predictive modelling

Social network analysis is based on information about interactions in a social network. The importance of telecommunication today makes the CDR a nearly perfect source to analyse these interactions and therewith analyse the impact a customer can have on his social network. It is obvious to assume that a churning customer has a direct impact on his social network.⁵ Therefore, social network analysis might be the perfect instrument to sharpen predictive modelling for churn management.

Considering the very poor information about the customer in the prepaid business, predictive modelling based on a customer's calling network might be a valuable source for predicting customer behaviour. In addition, the only contact channel of a prepaid customer is the mobile number itself. Consequently, a prepaid customer needs to be contacted before he churns, which makes this approach even more valuable. Recent tests of a provider have shown that social networks can be a reliable source for scoring the churn propensity of prepaid mobile customers.⁶

A study by the IBM India Research Lab analysed whether it is possible to predict a prepaid customer's churn rate only based on the link information of the available CDR data. Using the underlying social network of the calling data, it is possible to initiate a diffusion process with the churners as starting point. Assuming that each churner influences his neighbours to churn and these then also influence their neighbours and so on, a 'word-of-mouth' scenario is modelled. The amount of influence received by each customer can be

Figure 3: Impact of churning friends.

inspected at the end of the diffusion process. On the basis of this influence, customers can be assigned a propensity to churn (pp. 2–3).⁴

The diffusion model is based on the spreading activation techniques proposed in cognitive psychology and used for trust propagation (Figure 3).⁷

Analysing customer behaviour over a certain period of time has proven that churners directly influence their neighbours' churn behaviour (pp. 3–4).⁴ Interestingly, the curve of churners indicates that the probability to churn is significantly influenced by the friends who have churned in past months. It also shows that the first 10 churners have a strong influence on a customer's propensity to churn. This means that a single churner can have a substantial effect on his social network by changing the carrier. Although the effect seems to be quite linear at the beginning, the research proved that it has more of a cascading effect in that area, especially, when considering churners over subsequent months (pp. 4–5).⁴

The study by the IBM India Research Lab proved that depending on the spreading factor, it is possible to contact 55 per cent of potential churners by addressing 5 per cent of the customer base (pp. 4–5).⁴ However, before a campaign starts, the number of contacted customer always needs to be evaluated carefully. Contact costs and available resources always need to be considered in order to complete a campaign

successfully. Therefore, the number of contacted customers might need to be reduced to meet a campaign's targets.

Maximal individual customer expense

$$E_c = p_c \times v_c$$

where E_c = maximum expense per customer; p_c = propensity to churn and v_c = customer value.

With the calculation in the above equation, the maximum expense for an individual customer can be calculated. This is hardly dependent on a customer's value or the individual propensity to churn. The specific investment for retention purposes should not exceed E_c .

Time is often an important factor and therefore needs to be considered when performing analysis of information spreading in a social network.⁸ For the prediction of churn propensity, the time from the actual churn of a customer to the evaluation of the data is relevant. The question is when and how the social connections are impacted. Not using or terminating a contract has an immediate effect. Migrating to another provider is different. For prepaid customers it also has a rather prompt effect as expenses will increase owing to the higher off-net costs, whereas postpaid customers will not recognise it until they review the monthly bill. In conclusion, for most of the business cases, time has a negligible impact on accuracy. However, it must be considered if the impact is delayed for any specific reason.

To increase the accuracy of the social network prediction model, additional parameters such as social and demographic data might be considered as well. For prepaid contract, any data that can be gathered during the acquisition can be useful for predictive modelling afterwards. Reasonable information should be available if a prepaid card has been provided in a bundle or special feature.⁶ A combination

of existing techniques and predictive modelling based on social networks would most likely lead to a more precise prediction than these techniques do separately.

APPLICATION OF CUSTOMER SEGMENTATION

Pricing model

When talking about pricing model and social networks, the logical combination would be pricing based on social communities. However, there are other social network aspects that can have a notable impact on customer loyalty.

Personal pricing

Telecommunication service providers usually favour telephone calls in their own network. As a result, call tariffs to another provider's network hardly depend on a customer's individual contract. Furthermore, there are flat fee contracts that no longer distinguish between networks in the domestic market. However, these contracts come with a high basic fee and are therefore rarely used.

The combination of high off-net costs and low or even no charge for calls within a provider's network has a loyalty effect that can be traced back to a customer's individual social network (p. 49).⁶ The social network graph shown in Figure 4 illustrates an example of socially connected customers from different mobile network providers, all with similar contracts including high off-net costs.

Customer E is socially loosely connected to their provider's network and therefore needs to pay a lot of off-net fees to stay in contact with their main social contacts. As a result, it would be much more beneficial for Customer E to change to Provider X. This is not only the result of the general pricing method of telecommunication service providers, but is also strongly

Figure 4: Mobile customer network.

impacted by the social network of Customer *E*.

The example provided clearly indicates that the pricing model is not directly connected to a customer's social network, but indirectly forces communities to move to a single provider driven by the underlying social network connections.

Community pricing

The key success factor for community pricing is the generation of incentives for customers to build communities. Therefore, it is essential to first attract customers and then to keep them satisfied with the pricing model.

The basic concept is to offer special discounts for community members. Such a discount is a benefit for each group member, for example, discount on calls and SMS within the group. By restricting this discount to the communication within the group, customers are incentivised to get their friends and relatives into their community. This is exactly what a provider should aim for. With strong social connections in the individual communities, members are more likely to have similar interests. This makes it easy to clearly categorise groups and specifically address campaigns.

Discounts depending on the number of members of an individual community group make it even more attractive to increase the

number of participants. This is definitely an incentive to acquire more friends to be part of the community. Almost no interaction by the provider is required, and communities might grow naturally, supported by the worth-of-mouth effect.

There are various options to make communities even more attractive for customers. An option could be to provide special services and features that can be used by group members only. Whatever discounts and feature are offered, it is essential to keep them as simple as possible in order for customers to easily understand and manage them. In addition, group offers should not interfere with personal contracts.

Communities

With the growing population on social media platforms, the digital face has become a valuable instrument for telecommunication service providers. Users tend to have their favourite social media platform defined as the home page in their browser. This illustrates the growing popularity and emphasises the importance of having a digital face.

Owing to the missing option to link a user on a social media platform to a known customer, social media platforms can only be used for mass marketing. In other words, they cannot be used for efficient retention management, as it is not possible to carry out direct marketing campaigns with the available data. Because of the mass marketing aspect, social media can be better used for acquisition and cross-/upselling campaigns. For acquisitions, a wide range of potential customers in the corresponding segments can be reached through social media platforms and their underlying word-of-mouth effect.

Another use for social media is the evaluation requirements from the corresponding segments, for example, which new service would be useful or what would need to be changed in order to increase the usability of an existing

product. A further option in this direction is to test whether there is an interest in a specific new product before the product has been launched. Power users and early adapters could be offered involvement at an early product evaluation phase. Feedback can easily be collected through the platform and the product can be improved accordingly.

A benefit of social media is the self-care effect, for example, customer helps customer. This community effect allows for the reduction of support costs. However, in order to keep a community interested, active monitoring of what is happening and stimulating actions need to be carried out. In addition, the organisation maintaining a digital face needs to be prepared for attacks on social media platforms. Actions for emergency scenarios need to be clearly defined and communicated within the organisation. In case of an attack, incorrect behaviour can boost negative publicity and result in enormous reputational damage.

OUR RESULTS

To test the effectiveness of the described social network approach on churn, we carried out a project at a mobile telecommunication company.

At the time of the project, the company had at that time an increasing customer churn rate. The aim of the company was to develop and introduce a loyalty programme to stop churn and increase customer loyalty. The basic idea was simple: customers (social leaders) of this telecommunication company should have the possibility to select the people they talk with most and create their own groups: The higher the number of people in the group, the greater the benefit for the members. The social leaders could use the company's web site or their mobile phone to manage the member list. The programme should combine economical, functional and emotional components. For identifying the right target group and the

right services we used social network analysis and the Kano Model.

First, we analysed the existing customers using social network analysis. Customers with high influence on their network were identified. The idea was to encourage them to build social groups using their social influence. In a second step, we had to define the right services in order to make a social network within the company attractive. For this purpose we used the Kano Method⁹ to identify basic performance and excitement requirements for services. In a further step, a multi-step campaign was designed to contact customers with high influence. The results were impressive. Three months after the introduction of this loyalty programme, over 1000 networks were founded with 30 per cent of the existing customers. A first analysis after 4 months showed that the churn rate of the social network customers had decreased. At the same time they increased their spending significantly. However, further analysis over a longer period of time is needed to establish a more accurate and reflective result of the impact on churn and revenue.

Discussion and conclusion

In our approach, we proposed a social network-based segmentation using a social network portfolio analysis. The basic idea is to understand the importance of each customer from a social point of view. Our hypothesis was that social leaders influence the churn and consumer behaviour of their social environment. The question was how we can identify and segment them. For this purpose we only used CDRs, knowing that telecommunication companies have few socio demographic data for prepaid-customers. We proved that our segmentation can be used to form the right communities with the right social media and pricing measurements. The key to making the loyalty programme for both social leaders and network members more

attractive is the selection and introduction of accurate services. With the Kano Analysis we were able to identify the most relevant services for the leaders with high influence. Generally, before defining the target group for a Kano survey, our approach can be used in order to identify the most influential customers. Their opinion about the attractiveness of existing and new services is crucial for the success of campaigns and social programmes. At the same time, the introduction of the right incentives can accelerate the cross-/upselling and retention efforts of the company.

The discussed approach can be used in other industries as well. The relevant data for identifying the connectivity level and the size of the social network can be derived from social networks such as Facebook. However, a data strategy should be defined in order to integrate social data with existing data.

This social network segmentation approach enhances current propensity-to-churn or propensity-to-buy models. By using existing propensities in combination with the appropriate social segment, we can define effective loyalty programmes and campaigns. We delivered empirical evidence that this social approach enhanced with Kano Analysis and predictive modelling can contribute positively to churn reduction and spending increase. However, further

work is required in order to effectively measure the individual contribution of the different methods to customer loyalty.

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