



Understanding Customer Churn and its Mitigation: The Case of NOS *Comunicações SA*

Patrícia Farias da Silva Alves Pinto



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Teresa Maria Rocha Fernandes Silva (PhD)



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RESUMO

A indústria portuguesa das telecomunicações é caracterizada por um mercado saturado e altamente competitivo, no qual os clientes estão constantemente a mudar de operador. Este movimento foi nomeado por Berson et al (2000) como o fenómeno do *Churn* e tem sido alvo de especial preocupação por parte de várias empresas, ameaçando a sua base de clientes e rentabilidade.

Este estudo foi desenvolvido no âmbito de um estágio na empresa portuguesa de telecomunicações NOS Comunicações SA. Baseado na metodologia de Estudo de Caso, incluiu observação direta durante 6 meses e a recolha de registos para o ano de 2020. Esta investigação teve como propósito (1) compreender os tipos de *churn*, (2) identificar as principais variáveis associadas ao mesmo e (3) segmentar os clientes em grupos, permitindo às empresas desenvolver ações de retenção personalizadas a cada segmento.

Os resultados mostram que algumas variáveis (p.e. o nível de visualização de TV e o número de produtos/serviços que o cliente tem) têm um efeito mitigador tanto de *churn* voluntário como involuntário, enquanto outras (p.e. consumo de dados móveis e o número de reclamações) parecem potenciar o fenómeno. Por outro lado, o preço e o modelo dos equipamentos não têm uma associação clara com o *churn*. Para além disso, este estudo aborda o efeito individual de alguns produtos/serviços, provando que clientes que comprem equipamentos a prestações têm menos propensão para *churn*.

Finalmente, no que diz respeito à segmentação de clientes, este estudo concluiu que apenas 63% do *churn* involuntário deixou de pagar faturas por dificuldades financeiras, enquanto que o restante poderá ter outras motivações para *churn*. Quanto ao *churn* voluntário, 34% dos clientes não apresentam reclamações, o que torna mais difícil antecipar o momento de *churn*. Os outros grupos apresentam determinantes específicos que devem ser considerados aquando do desenvolvimento de estratégias de retenção.

Palavras-chave: *churn*, segmentação, retenção, telecomunicações

ABSTRACT

The Portuguese telecommunications industry is characterized by a saturated market with fierce competition, where customers are constantly switching to another provider. This movement was named by Berson et al (2000) as the Churn phenomenon and has been an increasing concern to many companies, hindering the customer base and its profitability.

This study was developed under the scope of an internship held at NOS *Comunicações* SA, a Portuguese telecommunications company. Following a case study research, it included direct observation during 6 months and the collection of archival records from the entire year of 2020. The purpose of this investigation was to (1) understand the types of customer churn, (2) identify the main variables associated with it and (3) segment these clients into groups, in order to develop customized retention actions to each segment.

The results show that some variables (e.g. the level of TV viewing and the number of products/services the client has) have a mitigating effect on both voluntary and involuntary churn, while others (e.g. mobile data usage and number of complaints) seem to increase the phenomenon. On the contrary, the price and the equipment model do not have a clear association with customer churn. Besides, this study elaborates on the individual effect of some products/services, proving that clients who buy equipment in installments have less propensity to cancel the contract than those who do not.

Finally, concerning customer segmentation, this study found out that only 63% of involuntary churners stopped paying invoices because they could not afford to pay, while the others might have other motivations to churn. Regarding voluntary churn, 54% of those clients do not have complaints, which makes it more difficult to anticipate the moment of churn. The other groups point out specific churn determinants that should be considered when developing the company's retention actions.

Keywords: churn, segmentation, customer retention, telecommunications

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I. INTRODUCTION

Companies have been constantly facing new challenges, due to either the emergence of new competitors, or technological innovations, that appear to be a more and more cross-cutting issue to different industries. Therefore, organizations have been focusing on new ways of creating value for their customers, improving their knowledge about who they really are, as well as deepening the relationship with them (Fournier & Avery, 2011).

This is especially important in the telecommunications sector, since, in a saturated market with fierce competition, there is no more room for organic growth, and customers are constantly moving from one provider to another. Besides, wireline businesses have been facing difficulties on differentiating their offer, as well as keeping their prices at a sustainable level (Jain & Surana, 2017). In addition, there are studies that show that existing customers are more likely to try new services and spend more money, than new ones, because of the trust and relationships that are built over time. Actually, according to a research done by Fred Reichheld of Bain & Company, increasing customer retention rates by 5% increases profits by 25% to 95% (Gallo, 2014).

Therefore, there is the growing need to study and understand the customer base in order to develop suitable actions that help the company retaining its clients. From a macro-perspective, this is related to the concept of Relationship Marketing, which has been a priority to telecommunications companies. Following Berry (1983), it can be defined as the attraction, maintenance and development of client relationship (as cited in Benouakrim & Kandoussi, 2013). This definition highlights the importance of not only attracting new clients, but also managing those relationships, so that they become loyal to the services the company provides, and less susceptible to abandon them.

This phenomenon of abandonment is usually referred to as “Churn”, which occurs at the moment of the customer’s life cycle in which it leaves the relationship and ceases the contract. As a benchmark, in the United States of America, the churn rate identified in the telecommunications sector was 21% in 2018, which means that those companies have lost 21% of their clients during that year (Statista Research Department, 2020). Consequently, Churn has been a more and more investigated issue worldwide, regarding its determinants, as well as suitable actions that help mitigating its effects within the companies’ businesses.

Some studies argue that high customer churn rates might be a consequence of poor attraction techniques, since companies are focused on attracting as much clients as possible, at all costs.

However, it is important to understand whether those are valuable clients or not. Deal seekers may be easily attracted by low prices, but once they find a better deal, they promptly move to another provider, which shows their little loyalty and, consequently, their high likelihood to churn (Gallo, 2014; Reichheld, 1993). These studies highlight the importance of building trustworthy and loyal relationships with customers.

Nevertheless, there are other authors that focus their investigations in the importance of data mining to build predictive models of customer churn (Sai & Sasikala, 2019; Hu et al, 2020). These models intend to gather the main features, regarding consumer behavior, of customers with a high likelihood to churn. This is helpful because, despite having limited marketing resources, companies will be able to target the right customers with retention campaigns.

However, there seems to be no common ground regarding the best approaches to avoid customer churn, that is, after knowing which customers are more prone to churn, which are the most appropriate mitigation actions.

This study, developed under the scope of an internship held at a Portuguese telecommunications company, *NOS Comunicações, S.A.*, seeks to understand and contribute with sound conclusions about this phenomenon.

In the telecommunications' sector, NOS offers latest generation fixed and mobile solutions for television, internet, voice and data for all market segments - Residential, Personal, Business and Wholesale, while it is also leader in cinema exhibition in Portugal.

This internship report aims to provide well-founded knowledge about different types of customer churn, identifying the main variables associated with them, in order to know these clients and segment them according to possible churn determinants. This will allow NOS to know better its customer base, anticipating customer churn and taking actions to mitigate it. Accordingly, and given the exploratory nature of the research objective, this study followed a qualitative methodology based on a case study. The investigation used data triangulation to corroborate findings from each source of evidence and get a more holistic approach to the phenomenon under analysis. The two main sources of evidence were direct observation and collection of archival records.

The results found in this study might also be applied in other companies from the telecommunications industry, that are highly affected by this phenomenon, but also in companies from other saturated industries, where customer retention is of great importance to the business's sustainability.

This report is organized into 5 main chapters, starting by a brief introduction to the phenomenon under analysis. Chapter 2 presents the literature review about relationship marketing and customer churn, elaborating on its determinants, predictive models and mitigation actions. The methodology and research questions are demonstrated in Chapter 3, as well as a description of the research context and the unit of analysis – NOS *Comunicações* SA. Finally, Chapter 4 elaborates on each research question, presenting the analysis and discussion of the findings, while Chapter 5 includes the main conclusions, pointing out managerial implications, limitations and future research directions

II. LITERATURE REVIEW

In this chapter, the concepts of Relationship Marketing, customer retention, and customer relationship life cycle will be presented (Section 1), as well as the Churn phenomenon, its main determinants and mitigation strategies suggested in the literature (Section 2).

1. Relationship Marketing and Customer Retention

1.1. What is Relationship Marketing?

The emergence of the service sector created different needs and interests within the service provider/client relationship, in comparison to the traditional consumer packaged goods. Therefore, there is the need to build long-term relationships rather than focusing on a single transaction. This is even more important as the competition increases, since companies will have to differentiate their offer and improve their competitive advantage, by adding value to the service/product they provide. This differentiation usually comes from an effort put into the development of customer-firm relationships (Gronroos, 2004). Customers, then, look for a more holistic approach, and the Relationship Marketing arises.

Many authors have tried to describe the concept of Relationship Marketing (RM), since Berry's first definition in 1983, as the attraction, maintenance and development of client relationship (as cited in Benouakrim & Kandoussi, 2013). Later, Kanagal (2009) describes RM as "the identification, establishment, maintenance, enhancement, modification and termination of relationships with customers/consumers to create value for customers and profit for organization by a series of ongoing exchanges that have both a history and a future", highlighting the value creation for the customer and the organization. Benouakrim & Kandoussi (2013), in turn, advocate that "relationship marketing is a strategic process aiming to establish, develop, maintain and strengthen the network of relationships with various stakeholders on the basis of strong economic and social standards and the achievement of common objectives", highlighting the role of other stakeholders.

The concept of RM has been evolving and used to reflect several situations, covering different dimensions of marketing and organizations. Brodie, Coviello, Brookes & Little (1997) have already pointed out this issue, stating that RM can be applied at four levels: (1) as a technology-based tool for database marketing; (2) as managing relationships between buyers and sellers, especially regarding customer retention (this is especially important concerning the Churn phenomenon); (3) as a form of "customer partnering" promoting

cooperative and symmetric relationships; and, lastly, at a broader level (4) as an incorporation of “everything from databases to personalized services, loyalty programs, brand loyalty, internal marketing, personal/social relationships and strategic alliances.” (as cited in Kanagal, 2009).

Nevertheless, every definition seems to revolve around the idea that RM is a process that aims to create long-term value for every party involved – not only the seller and the buyer, but also any other stakeholder – and all marketing activities must take this process into account, following an integrated Marketing approach.

RM differs from the conventional marketing since it focus on the long-term customer value, whereas the others’ focal point is immediate customer satisfaction at a reasonable price (Yamta et al, 2018). Therefore, it has a huge impact on customer satisfaction, customer loyalty and, consequently, on customer retention – which can be considered the opposite of customer churn, the target of this study. This focus of RM on customer retention is particularly important for industries with high front-end costs (e.g., telecommunications sector) since customer acquisition can be 5 to 10 times more expensive than customer retention (Gummesson, 1999; as cited in Opresnik & Hollensen, 2019). To develop long-lasting relationships, building trust, commitment, and a proactive communication is key (Ndubisi, 2007; Morgan & Hunt, 1994). Customer retention can result in e.g., increased purchase intentions, sales growth, resistance to competitor’s offers and counter persuasion, willingness to pay a price premium and, finally, willingness to recommend (Palmatier et al., 2009; Das Narayandas, 1998). Therefore, RM contributes to the evolution of customer life-time value, as it will be discussed next.

1.2. Customer Relationship Life Cycle

As Marketing evolves from the focus on a single transaction to a broader perspective of the buyer-seller relationship, the several moments in which the buyer interacts with the seller, before and after the transaction, were given increased research attention. Accordingly, Dwyer et al (1987) developed a framework for the Customer Relationship Life Cycle (CRLC) encompassing five different phases: (1) Awareness, (2) Exploration, (3) Expansion, (4) Commitment and (5) Dissolution.

i) Awareness

In this phase, two parties recognize potential interest in one another, though there are only unilateral demonstrations of attractiveness. To get the attention of potential buyers, sellers' marketing activities are of great importance at this stage.

ii) Exploration

Exploration marks the beginning of bilateral interactions and the emergence of possible relationships. Each partner assesses the obligations, benefits and burdens arising from the relationship. The exploratory relationship is still very fragile due to the high independence and low investments required, which might lead to termination.

iii) Expansion

In this stage, there is higher interdependence between the two parties involved, as well as increased benefits. Therefore, it is no longer an experimental phase, but the relationship gets stronger as parties develop trust, the rewards get consistent and the attractiveness of the relationship increases.

iv) Commitment

Commitment implies an implicit or explicit engagement that ensures the continuity of the relationship. In this advanced phase, buyers pay less attention to other alternatives even though they offer similar benefits, which can be considered the core of customer loyalty.

v) Dissolution

This is the end of the relationship, and, though it is easily initiated unilaterally, it can be triggered by one or both parties. As it was explained in the previous phases, the interdependence grows over the life cycle, as well as the commitment to the relationship, leading to the termination being harder. This might occur as a consequence of dissatisfaction from one party, when it realizes that the costs of continuation outweigh the benefits.

Santouridis & Tsachtani (2015) further extend the CRLC concept to the case of a Greek Bank, which is similar to a telecommunications company, since they are both subscription-based services that rely deeply on customers' relationships (Table 1).

Table 1: CRM Processes during the CRLC

Stage	CRM Processes
Initiation	Similar to Dwyer's "Awareness" phase, CRM must focus on identifying valuable customers as well as studying the cost of re-establishing a relationship with lost or inactive ones.
Acquisition	Processes oriented to customer acquisition, as well as the measurement of investments made to that purpose.

Regain	This is usually called win-back strategies, aiming to regain lost or inactive customers.
Maintenance	In this stage, CRM keeps track of customer progress in the life cycle.
Retention	This stage highlights the importance of Dwyer's "Commitment" phase, in which CRM focuses on developing customer loyalty, retention programs, service and product customization in order to strengthen relationships with valuable customers.
Expansion	In this framework, the expansion phase comes after retention (in contrast to Dwyer's model), and CRM must focus on cross-selling, up-selling and incentives in order to intensify business.
Exit	CRM must terminate relationships with non-profitable, lower-value or problematic customers (Dwyer's "Dissolution" phase).

Source: Adapted from Santouridis & Tsachtani (2015) and Dwyer et al (1987)

The current study will focus on the last stage of CRLC, called the "Dissolution" or "Exit" phase. In subscription-based services, like the telecommunications and banking services, it is crucial to understand what it takes for a customer to cease the relationship with an organization, as well as proactive actions a company must take in order to avoid it. The following chapter will elaborate on these issues, usually called "Customer Churn".

2. Customer Churn

The Churn phenomenon was described by Berson et al (2000) as a term used in the telecommunications sector, meaning the customer movement from one provider to another (as cited in Hung et al, 2006). Following this line of thought, "churn management" was also described by Berson et al (2000) as the process of retaining profitable customers (Hung, 2006). This is an important aspect of retention campaigns, that is, targeting those customers that are more sensitive to the intervention, rather than those with higher risk of churning (Ascarza, 2018). That focus on profitable customers must start on the acquisition process, since high customer churn rates usually come from acquisition campaigns targeting deal seekers, rather than loyal customers (interview by Amy Gallo, Harvard Business Review, 2014).

2.1. Types of Customer Churn

Churn can be of several types, distinguished by different authors. Yang & Chiu (2006) point out voluntary, unavoidable and involuntary churn. Voluntary churn occurs when the customer decides to terminate the contract – due to incorrect perception of Price, Quality, Coverage, Customer Service, Technology, among others (Adikari et al, 2008) – whereas in involuntary churn it is the company who terminates the service, due to payment failure, theft

or fraudulent usage. Unavoidable churn is difficult to differentiate from voluntary churn since, as Yang & Chiu (2006) say, it occurs when “customers die, move or are permanently removed from the market place”.

Shaaban et al (2012), besides the distinction between voluntary and involuntary churn, also divide voluntary churn into two sub-categories: incidental churn, which occurs because something happened in the customers’ lives, such as a change in financial conditions or a change in location; and deliberate churn, which is due to technological reasons, price sensitivity, service quality factors, among others. Burez & Poel (2008), in turn, argued that customers that decide not to renew the contract should be named commercial churners, while customers who can no longer afford the service are financial churners.

For the purpose of this study, and according to NOS’s standards, there will be only two types of churn: involuntary churn will be especially about customers’ credit issues, and voluntary churn will include every customer that willingly leaves the company. This will be further discussed in Chapter III.

2.2. Main Determinants of Customer Churn

It is clear the importance of understanding a phenomenon to better act towards its mitigation. CRM departments focus, precisely, on understanding consumer behaviors and expectations and on managing the relationships with them. In this section, we will try to examine the existing literature about consumer motivations to abandon the relationship with a company, that is, the determinants of customer churn.

Customers tend to switch from one provider to another for different reasons, regarding different industries (Eshghi et al, 2006). Therefore, in this analysis we will take a deep look at telecommunications industry’s main drivers to churn. Table 2 provides an overview of studies about this phenomenon, from different countries, as well as research variables used in each of them.

Table 2: Churn determinants for the telecommunications industry

Authors	Market/Country	Research variables
Keaveney (1995)	Not clear	Pricing, inconvenience, Core service failure, service encounter failures, response to service failures, competition, ethical problems,
Keaveney (2001)	Not clear	Relative sources of informational influence, Usage level, Propensity for risk-taking, Income and education, satisfaction and involvement

Kim & Yoon (2004)	Korean mobile telephony market	Call quality, tariff level, handsets, brand image, as well as income, and subscription duration
Ahn et al (2006)	Korean mobile telecommunications	Customer dissatisfaction, switching costs, service usage and customer status
Eshghi et al (2006)	Telephone service	Customer Satisfaction, Customer Expectation, Perceived Value and Perceived Quality
Adikari et al (2008)	Sri Lanka Mobile Market	Price, misalignment between packages and target audience, rewards given to existing customers
Oghojafor et al (2012)	Nigerian telecommunications	High call rates, poor service facilities, unattractive service plan, availability of superior alternative service providers, off-beam
Svendsen & Prebensen	Norwegian Telecommunications	Brand image, Customer Satisfaction, Age and Switch costs
Benedek et al (2014)	Telecommunications sector in central Europe	Social Embeddedness
Gosselin (2017)	Canadian Pay-TV industry	Basic Services and value-added services
Akmal (2017)	Pakistan Telecom Industry	Network coverage, spam messages, hidden charges, billing transparency, network rates
Mwaura (2019)	Telecommunications sector in Kenya	Social Environment, Service Interface, Price, Retail Atmosphere
Kim et al (2019)	Korean bundled market	Subscription decisions, switching costs
García-Mariñoso &	Mobile operators in Spain	Bundles with fixed services, consumer inattention, past mobile switching
Soomro et al (2020)	Mobile telecommunications sector	Pricing structure, value-added and service quality
Uner et al (2020)	Turkish telecommunications sector	Customer satisfaction variables (call quality, brand image, billing, tariff level), Data usage, family/individual plans, promotional campaigns

Source: Own elaboration

These studies seem to demonstrate that churn determinants must be analyzed carefully, regarding the region where they are examined and its telecommunications policy (Dass & Jain, 2011). This literature review will focus on the following drivers and explain their impact on customer churn: price, bundles, switching costs, service usage, and customer satisfaction.

i) Price

Several studies aim to understand whether the pricing structure of a company and of its competitors might influence the decision of a customer to switch providers. From the customers' perspective, price is the amount of money they have to pay in order to benefit from a product or service, whereas for companies, it is the source of revenues and profit. Price can also be analyzed as the value perceived by customers, that is «Customers' assessment of the service provider's "value for money" compared with competing service providers» (Eshghi et al, 2006).

In the telecommunications industry, increasing competition has been forcing companies to respond through more competitive offers, bundles and price cuts in order to keep their competitive advantage (Jain & Surana, 2017). As a consequence, telecom companies are constantly trying to attract new clients through campaigns and price discounts, which will increase the churn rate of competitors. Price was the third largest switching category (Keaveney, 1995), pointing out different problems related to it: High Price, Price Increases, Unfair Pricing and Deceptive Pricing. Related to the first problem, there are several studies proving the relationship between higher price packages and switching behaviors (Yuan et al, 2019; Soomro et al, 2020).

Besides, hidden charges and rates are also often mentioned by customers as a motive for dissatisfaction regarding telecom companies. Akmal (2017) found out that lack of billing transparency and hidden charges are one of the main drivers to customer defection.

However, telecom companies, as it was mentioned before, are increasing their bundles' offer with Pay-TV, internet, landline and mobile phones, leading to price discounts that may have a different impact on the switching behavior (Jain & Surana, 2017).

ii) Bundles

Bundles result from multiple services/products sold as a single package at a discount, rather than one single product (Guiltinan, 1987; as cited in Kim et al, 2019). They can be of several types and dimensions. Kim et al (2019) analyze double-play-service (DPS), triple-play-service (TPS) and quadruple-play-service (QPS) bundles. They might include Pay-TV plus fixed landline or fixed internet (DPS) or even those three services plus a mobile SIM card or broadband (QPS).

Kim et al (2019) pointed out the top five EU countries purchasing bundle subscriptions, being them the Netherlands (93%), Malta (86%), Slovenia (84%), Luxembourg (83%) and Portugal (78%), which shows the importance of this type of offer among telecom companies.

The relationship between bundles and the consumers' switching behavior has been studied in the literature, showing evidence that when a customer bundles their service, the likelihood of abandoning the company decreases, in comparison to individuals using stand-alone services (Burnett, 2014). In addition, though economic benefits and usage convenience increase as the number of services bundled increases, the concern about lock-in also rises (Kim et al, 2019).

Bundling mobile services with fixed services reduce the odds of switching by more than one-third, and this effect is even bigger when the bundle includes several mobile lines (García-Mariñoso & Suárez, 2019). Concerning the impact of different fixed bundled-services on customer churn, Burnett (2014) added up that Pay-TV is the least likely to be switched, whereas the broadband is the most likely one.

iii) Switching Costs

A customer might want to leave a company for many reasons, but there are two different barriers: customer loyalty, that is when the customer willingly wants to maintain the relationship, and switching costs, which act as constraints, preventing a customer from moving to a competitor (Ahn et al, 2006).

According to Burnham et al (2003), they may be of three different types: procedural switching costs, which are related to the expenditure of time and effort on the process of looking for another provider and establishing a relationship; financial switching costs, consisting of benefits loss or financial-loss costs; and, lastly, relational switching costs, including personal-relationship loss and brand-relationship loss costs.

In the telecommunications industry, apart from the lock-in effect of bundles, loyalty points and membership card programs are pointed out as major components of switching costs (Ahn et al, 2006). According to the typology of Burnham et al (2003), these components are financial switching costs, since customers lose those benefits when switching providers.

Procedural switching costs does not appear relevant to this industry, since companies have relatively similar offers and procedures. However, it is important to note that switching costs have very different impacts on prepaid and postpaid customers (Thoumy & Abdallah, 2017).

In the case of mobile prepaid customers, for example, the number portability service has decreased the costs of switching to a different provider.

On the contrary, postpaid and bundled customers are usually constrained by a 24-month-period in which they cannot cancel the contract unless they pay early termination fees. In Portugal, telecom companies have well-organized structures to renew this binding period before the end, in order to increase the switching costs and, consequently, avoid customer churn. The Portuguese regulator ANACOM has been developing new norms about this issue, that are expected to be implemented in 2021, imposing restrictions to the binding

period. This measure will decrease consumers' switching costs, and force companies to find new ways of retaining their clients, and avoid customer churn.

iv) Service usage

Service usage, especially mobile data, has been extensively studied in the literature as a predicting measure of customer churn (Keaveney, 2001; Ahn et al, 2006; Uner et al, 2020). However, most of the studies focus their investigation on the mobile market, and in the consumption of internet, the number of calls or text messages sent.

There seems to be no common ground regarding the relationship between service usage and switching behavior. There are studies proving that customers with less service usage are more likely to switch (Keaveney, 2011). Actually, Uner et al (2020) have studied the influence of texts, calls and data on both churn and loyalty. They found out that data usage is a decisive factor when choosing a tariff and that an increase in data usage improves the relationship between the customer and its provider leading to a decrease in customer churn.

On the contrary, there are also results showing that heavy users tend to be more price sensitive and, consequently, more likely to churn in order to get a better discount in another provider (Ahn et al, 2006). This divergence of conclusions, about the association between service usage and switching behaviors, can be attributed to the fact that usage is usually measured by using financial indicators, such as the monthly expenditure, rather than the actual service usage statistics (Gosselin, 2017).

Gosselin (2017) studied the influence of basic services and value-added services on customer churn in Pay-TV subscription services, overcoming the limitations of financial indicators used in previous studies. They also highlight the difference between basic and value-added services (VAS). The latter aim to improve customer experience, and can be defined as “the availability of additional services over and above basic TV programs” (Lin et al, 2012), including services like video-on-demand, premium channels, high-definition and ultra-high definition, among others. Gosselin (2017) concluded that VAS users were indeed less likely to churn than non-users, which confirms findings by Keaveney (2001). However, the type of VAS is important when analyzing their effect on customer churn. Payable VAS appear to have a positive relationship with switching behaviors, since the increase on customer expenditure makes it more price sensitive, increasing the likelihood of defection (consistent with findings by Ahn et al, 2006).

The variety of services a company provides, apart from the basic ones, is also pointed out as a driver to customer satisfaction (Uner et al, 2020), as it will be explained below.

v) Customer Satisfaction

Customer satisfaction has been emerging as an increasingly important means of customer retention, especially as a consequence of several measures implemented by regulators to protect consumers from big telecom companies, like, for example, the end of the binding period.

Customer dissatisfaction is proved to be an important driver to churn, transversal to different industries. Actually, García-Mariñoso & Suárez (2019) showed that unsatisfied consumers are more than three times more likely to switch providers than satisfied ones.

There are many ways of describing customer satisfaction, and almost every attribute delivered by a company throughout the entire customer journey might influence this indicator. Uner et al (2020) identified 7 variables that influence customer satisfaction – some of them related to the relationship with the provider and others to the service quality: Call Quality, Internet Speed Quality, Tariff Level, Brand Image, Variety of Services, Customer Services and Billing.

Svendsen & Prebensen (2013) have proved not only the positive relationship between brand image and customer churn, but also the interaction with customer satisfaction. They have found out that there are brands that can retain even their dissatisfied customers, functioning as a switching cost. It does not mean that a strong brand has more satisfied customers, but it makes them less susceptible to switching providers, if they are dissatisfied.

Service quality, in turn, appears to be a crucial topic when it comes to customer satisfaction, including call quality, connectivity and complaint management (Soomro et al, 2020). In fact, complaint management has been a great concern for telecom companies as service quality has been an increasing subject of several studies (Keaveney, 1995; Kim & Yoon, 2004; Eshghi et al, 2006). Ahn et al (2006) proved that customers with a higher number of complaints are more likely to churn than satisfied ones. Garín-Muñoz et al (2016) also found out that proper complaint handling leads to satisfied and loyal customers. However, customers that are dissatisfied with poor service quality might not always voice their complaints (around 42% of those declaring service problems), which makes it more difficult to identify them.

Therefore, companies might focus on developing proactive actions that identify unsatisfied customers and on delivering satisfactory services, in order to increase retention rates (García-Mariñoso & Suárez, 2019).

2.3. Predicting Customer Churn

These determinants of customer churn might be used by companies to better understand their customer base and try to anticipate their switching behavior. This is usually called the churn management, consisting of identifying/predicting which customers are prone to churn and develop suitable actions that help retaining profitable customers (Berson et al, 2000).

According to Burez & Poel (2007), there are two different approaches to churn management: (1) untargeted approaches which aim to increase brand loyalty and customer retention through mass advertising, and (2) targeted approaches, when a company identifies customers that are more likely to churn and develop direct campaigns. Usually, companies offer incentives and discounts to avoid customers from switching to competitors. However, those incentives might consist of huge costs when applied to the entire customer base. Therefore, targeted approaches have been growing and may even be divided into reactive and proactive approaches (Burez & Poel, 2007). As their names suggests, the first strategy happens when a customer communicates their intention of abandoning the relationship and the company reacts accordingly, whereas the second one includes what it was explained previously – identifying and targeting potential churners in advance.

Therefore, it seems mandatory to, primarily, focus the company's efforts on predicting customer churn. The collection of huge amounts of information about consumers' characteristics and behaviors, coupled with the development of advanced data mining techniques, has been allowing telecom companies to establish more and more targeted CRM programs.

A lot of research has also been conducted, within the fields of marketing and customer relationship management, about the best ways of predicting customer churn, using data mining techniques, as it is described in Table 3. However, there seems to be no common ground about the best technique or combination of techniques to be implemented.

Table 3: Methods to predict customer churn

Action	Methods used	Authors/Studies
Predicting Churn	Decision Trees	Wang et al (2009)
	Logistic Regression	Sai & Sasikala (2019)
	Decision Trees and Logistic Regression	Dahiya & Bhatia (2015), Dalvi et al (2016)
	Decision Trees and Neural Network	Hung et al (2006), Hu et al (2020)
	Classifier's certainty estimation using distance factor	Amin et al (2019)
	Propagation Models	Zhang et al (2012), Kim et al (2014)

Source: Own elaboration

2.4. Mitigating Customer Churn

After knowing, in advance, which customers are more likely to churn, companies must focus on developing proactive actions to target them in order to increase customer retention, which, as it has been explained before, is more expensive than customer acquisition (Gummesson, 1999).

Although mitigation actions are hardly explored in the literature, they are of extreme importance from a managerial standpoint. Table 4 shows some studies that tried to develop this issue.

Table 4: Strategies to mitigate customer churn

Action	Subject of analysis	Authors/Studies
Mitigating Churn	Free incentives, special customer events, customer satisfaction questionnaires	Burez & Poel (2007)
	Rate plan optimization	Wong (2011); Ascarza et al (2016)
	Leveraging service recovery strategies	Borah et al (2020)

Source: Own elaboration

Burez & Poel (2007) have studied the impact of targeting customers with a higher likelihood to churn, with three different alternative marketing strategies: giving free incentives, organizing special customer events, and obtaining customer feedback through questionnaires. The three alternatives appeared to reduce the churn rate significantly, within the Pay-TV market. However, due to the costs of the first two strategies, the customer satisfaction questionnaires turned out to be the most profitable action.

Wong (2011) and Ascarza et al (2016) tried to mitigate the problem of misalignment between customers' needs and their rate plan, that lead to higher churn rates among those customers.

The former investigated residential customers of a Canadian wireless carrier, whereas the latter had the cooperation of a south American wireless communications company. Wong (2011) concluded that proactively recommend the rate plan that better fit the customers' needs lead to a decrease in the churn rate, although short-term profitability must be sacrificed sometimes in order to realize these benefits. Surprisingly, Ascarza et al (2016) found out that this action would have the opposite effect on customer churn, since it will decrease customer's inertia on looking for better opportunities.

Borah et al (2020) suggest that customer churn related to poor service quality should be managed by aligning a company's service recovery strategies with different types of service failure. Process failures and outcome failures have different effects on customer churn and, thus, must be solved through different strategies.

There are some authors, in turn, who advocate that it is unworthy to target customers that are more likely to leave the company, if those customers are not easily influenced by such campaigns. In other words, most recent approaches target customers based on their profit potential in order to get the most profit out of a retention campaign (Verbeke et al, 2012). Actually, retention programs are sometimes miscarried not because companies have offered the wrong incentives, but because they have targeted the wrong customers (Ascarza, 2018).

Therefore, mitigation actions and their target audience should be carefully analyzed, as well as its implications to the company's profitability.

III. EMPIRICAL STUDY

1. Research Objective

This study aims to understand the Churn phenomenon and how companies must act to mitigate its effects. Firstly, it aims to explore the churn phenomenon within bundled fixed telecommunications services and, lastly, suggest some proactive actions that could be used to target different customers, according to their possible motivations to churn. This is a crucial issue for many companies, especially those subscription-based businesses, which are highly dependent on their customer base. This is the case of the Portuguese telecommunications sector, a costly industry concerning front-end costs, dealing with a saturated market where it is difficult to acquire new subscribers.

2. Research Methodology

Given the exploratory nature of the research objective, this study followed a qualitative methodology. A qualitative methodology is characterized by the study of a phenomenon, in a practical and natural context, by building a theory from the data that is available – inductive model (Aspers & Corte, 2019).

This investigation focused on a specific case study, *NOS Comunicações SA*. This qualitative research strategy is fundamental to study a contemporary phenomenon, like customer churn, when the investigator has little control over it and the boundaries between the phenomenon and the context are not evident (Yin, 2003). Actually, customer churn is highly related to the products/services and to the CRM practices specifics of a company.

Therefore, for the purpose of this investigation, the author developed a holistic single-case design, following the recommended Components of a Research Design proposed by Yin (2003)¹:

1. A study's questions.
2. Its unit(s) of analysis.
3. The criteria for interpreting the findings.

¹ Given the exploratory nature of this study, propositions or theoretical hypothesis were not developed, and, thus, the (optional) component proposed by Yin (2003) was not included.

Firstly, considering the broad objectives of understanding why customers churn and how companies can avoid it, this study aimed to answer the following research questions (RQ):

RQ1: “What types of customer churn exist?”

RQ2: “What are the main variables associated with customer churn?”

RQ3: “How can churners be segmented?”

The research started by studying customer behavior, regarding voluntary and involuntary churn (RQ1). Afterwards, it aimed to understand whether or not some customer variables can be associated with customer churn (RQ2), in order to identify critical groups of customers and their possible motivations to churn (RQ3). Afterwards, NOS will be able to better understand the phenomenon and develop customized strategies to target those groups of customers.

Secondly, as it was mentioned before, the unit of analysis was *NOS Comunicações SA* (further described in section 2.1. of this chapter) and, in particular, the CRM department, responsible for the churn management. This single unit of analysis was chosen following an academic internship. Besides, it is suited for the analysis, by being representative of the Portuguese telecommunications sector and, thus, a proper way for studying the churn phenomenon in this industry.

The procedure of data collection and the different sources used in this investigation will be described in section 2.2. of this chapter.

Regarding the criteria for interpreting the findings, the author used a “pattern matching” technique (Yin, 2003), by trying to identify differences and similarities, for the variables under analysis, between the customer base and the customer churn. Depending on those observed differences or similarities, this study concludes about the impact of each variable on the customer churn.

2.1. Unit of Analysis

The investigation is conducted through an academic internship held at *NOS Comunicações SA*. – hereinafter referred to as NOS. The internship occurred between September 2020 and March 2021 – corresponding to, approximately, 1 056 hours – at the CRM department and, more precisely, at the Reporting and Business Analytics team.

The churn phenomenon will be analyzed for convergent and non-convergent² customers, from the residential segment³, with post-paid bundles including services like Pay Tv, Fixed and Mobile Internet and Fixed and Mobile Voice.

Section 2.1.1. presents an overview of the research context, i.e. the Portugal telecommunications industry in 2020, the main events and their possible effects on customer churn. Section 2.1.2. includes a contextualization about the NOS Group and, especially, about NOS *Comunicações* SA.

2.1.1. Portugal Telecommunications Industry in 2020

Portugal has a medium-sized telecom market with a strong mobile sector and a growing broadband customer base.

According to ANACOM's "Facts and Figures 2020" report, MEO is the leading operator in Portugal, with a market share around 40% in all market segments, followed by NOS, Vodafone and NOWO. In the Pay-TV segment, NOS used to have the highest market share, having been surpassed by MEO in 2020 – 39.0% and 40.0%, respectively. Vodafone, in turn, held a market share of 17.7% while NOWO accounted for 3.5% of the total subscribers.

In 2020, the bundled services have increased the number of subscribers by 4.4% in comparison with 2019, to a total of 4.2 millions. Revenues in this segment have also gone up by 5% to 1.7 billions of euros. The main type of bundle is the 4/5P, which consists of 4 or 5 products/services bundled, accounting for 50.3.% of the total. The Average Revenue per User (ARPU), in 2020, for 4/5P bundles was 43.79€ per month.

The year of 2020 was marked by the covid-19 pandemic – which has affected all industries in very different ways – and by the 5G auction – essential to the deployment of 5G services in Portugal.

On the one hand, the pandemic resulted in large-scale job losses, as well as in a decrease in the families' disposable income. Consequently, in April, the government has prohibited⁴ the suspension of the supply of goods and basic services – like the telecommunications ones – in cases of late payment derived from unemployment or covid-19 infection. In addition, in

² A convergent customer has a bundle with mobile voice or mobile internet.

³ As it was described in the Introduction part, NOS operates in all market segments – Residential, Personal Business and Wholesale.

⁴ Law 7/2020 of 10 April.

these situations, clients could also ask for the termination of contract without paying early termination fees. This legislation had an obvious impact on customer churn, especially involuntary one⁵.

On the other hand, another major consequence of the pandemic was the acceleration of the digitization of the economy. Public and private sectors were forced to rapidly migrate their services to an online-basis, with many people working and studying from home. This has affected the telecommunications industry, by overloading the network and possibly jeopardizing the service quality. Actually, ANACOM reported an increase of 55.0% in the average internet access traffic, resulting in 198GB/fixed access, per month. Fixed telephone services as well as mobile voice and internet traffic have also soared, derived from the imposed social distancing. Therefore, this crucial nature of telecom services, both for communications and home working, will offset the previously mentioned pressures on the disposable income.

The deployment of 5G services has been undertaken through a coordinated Europe-wide approach, ensuring that markets are prepared for 5G simultaneously. In Portugal, the 5G auction had been postponed because of the pandemic, and the phase for new entrants has started on December 2020. The main phase, aimed to the main players, has started on January 2021 and has not finished in the first quarter of 2021, failing to accomplish one of the objectives proposed by ANACOM⁶ of launching 5G services in that period. Portugal is one of the three European countries that have not launched commercial fifth generation services yet.

To conclude, the telecommunications industry has been facing some threats that might have negative effects on customer churn, such as the emergence of OTT (over-the-top) services, the pricing competition and on-going regulatory measures to reduce termination rates and the binding period. However, companies have been deploying considerable efforts towards the improvement of the service quality and customer satisfaction, by investing on the expansion of the fiber-optic network in Portugal – in 2020, 88.5%⁵ of Portuguese households were wired high-speed network⁷ –, as well as on 5G services – 5G-supported mobile data is expected to be the main source of revenue growth in coming years.

⁵ Further explained in Chapter IV.

⁶ ANACOM's "Facts and Figures 2020" report.

⁷ High-speed networks include FTTH (Fiber-to-the-home) and HFC (Hybrid-Fiber-Coaxial). FTTH consists of a direct connection between the central and the client's home, while HFC uses coaxial cable as intermediary between the fiber cable and the client's home.

2.1.2. NOS Comunicações SA

“In an adverse economic environment, during 2020, we have accelerated the rhythm of implementation of our network, expanding even more our capabilities and fixed new generation network coverage, while preparing the way to the implementation of 5G.”

Miguel Almeida, CEO

NOS was born in 2014 from the merger of two of the biggest telecommunications companies in Portugal – ZON and Optimus. It offers latest generation fixed and mobile solutions for television, internet, voice and data for all market segments – Residential, Personal, Business and Wholesale.

Miguel Almeida is the CEO, since 2013, of NOS SGPS, a public company quoted on the main Portuguese stock exchange index (PSI-20). Besides NOS *Comunicações* SA, NOS SGPS manages other companies and businesses (Appendix 1) – e.g. it has the largest network of cinemas in Portugal, a participation in SPORT TV and supports national and international music by bringing the best artists to NOS Alive and NOS Primavera Sound.

2020 was the best year for RGU⁸ growth since 2017 (to a total of around 10 million), which is evidence of how important telco services are for people and businesses. At the end of 2020, NOS had 1.7 million Pay TV customers, 1.5 million Broadband customers, 1.8 million Fixed Voice customers and 5.0 million Mobile customers⁹.

Despite the fall in sales in the cinemas segment, due to the covid-19 pandemic, in the telco sector NOS was able to deliver innovative and differentiated solutions in the connected devices ecosystem, while focusing on digital and customer experience. For example, in July, NOS launched a low-cost sub-brand called WOO, proclaiming to be a 100% digital telco. In October, Vodafone and NOS signed a network-sharing agreement in order to efficiently increase coverage in both current and future technologies, in a more environmentally and socially responsible way. NOS was also the first operator in Portugal to allow customers to self-install TV and Internet at home, bringing convenience, speed and safety to the customer journey.

⁸ Revenue Generating Units.

⁹ 2020 Annual Report and Consolidated Accounts

Finally, 2021 will be a turning point for NOS, by centering its strategy in the 5G revolution, with the slogan “Do what nobody has done before”¹⁰.

2.2. Data Collection

Case studies must not rely on one single source of information. Actually, one of its strengths is that it allows the investigator to combine multiple sources of evidence – Data Triangulation (Yin, 2003). Applying this technique is usually more complex and expensive than using a single source of evidence. However, this case study was framed within an internship at NOS and, thus, the author was able to (1) conduct direct observation and (2) collect archival records in order to get a more holistic approach to the phenomenon under analysis and to corroborate the information gathered from each source of evidence.

Applying data triangulation in a successful way implicates an integrated analysis of the findings from each source and, for that reason, the results of this investigation are all described in chapter IV.

2.2.1. Direct Observation

Direct Observation is commonly pointed out in case study research as a distinctive and complementary way of collecting data, that is not used in other methodologies (Yin, 2003).

This source of evidence was crucial in the initial stage of the investigation, allowing the author to understand the company’s perceptions about the phenomenon, like it is suggested by the Case Study Observational Research (CSOR) framework (Morgan et al, 2017). This framework gives special attention to the order in which observation data is analyzed, arguing that it should be the first source of evidence to be collected. This allows the author to have an overall background of the phenomenon before collecting non-observation data that will corroborate the previous findings.

In this study, observation data included structured and unstructured observations (Taylor-Powell & Steele, 1996) because, on the one hand, the author wanted to answer specific questions about NOS’s churn management (such as, for example, which were the most important variables to take into account in the collection of non-observation data) and, on the other hand, an open-ended format was important to record unexpected happenings and to understand the company’s culture about this topic.

¹⁰ In Portuguese: “Faz o que ninguém fez”.

The author participated in informal meetings with people from different teams and areas of expertise, such as Customer Service, Churn and Retention, Loyalty Programs, Product Management, who contributed with different perspectives and concerns about customer churn, that were extremely useful to the collection of non-observation data and to the development of an integrated analysis about this phenomenon.

To sum up, this source of evidence was useful to get an overview about customer churn (RQ1) and to identify crucial variables that should be further analyzed (RQ2). Knowing how churn is managed by NOS and the interdependent role of different departments in this process, also allowed to better comprehend what is, actually, being done to mitigate this phenomenon (internal benchmarking) and what still can be done on that matter.

2.2.2. Archival Records

Archival Records are a great source to be used in conjunction with another sources of evidence, which provide longitudinal data, generate new theories and dynamics and improve the validity and reliability of the case study research (Welch, 2000). Marciano et al (2018) highlights the importance of the integration of computational science into the analysis of archival records, since many companies and institutions have been building large-scale databases from which researchers can benefit.

To understand customer churn, this study analyzed several databases from NOS's data warehouse, which includes different types of information collected from all departments and services.

For the purpose of this investigation, the author collected data from the entire year of 2020, which consists of a universe of more than 1 million customers from the residential segment, per month. After collecting the total customer base and the total customer churn for 2020, the author crossed that data with relevant information from the last 7 years, from different departments – namely, Customer Service, Consumer Consumption, Equipment, among others. The process of gathering this evidence was simplified because of the previous collection of observation data, which helped identifying the most relevant variables.

Due to the complexity and extension of the evidence collected, data was prepared and manipulated using SQL Server, being an example of the employment of computational methods, proposed by Marciano et al (2018).

It was considered the weight of each variable in both voluntary and involuntary churn, its evolution during the year of 2020, and its representativeness in the total customer base, in

order to assess whether or not the two groups of clients had similar characteristics¹¹. In addition, the author computed the 2020 annual churn rate¹² for each variable's category to understand which customers were leaving the most. These characteristics were then used to segment NOS's churners (RQ3).

Figure 1 shows the overall research design and the structure of Chapter IV, in which the main findings of this investigation will be presented.

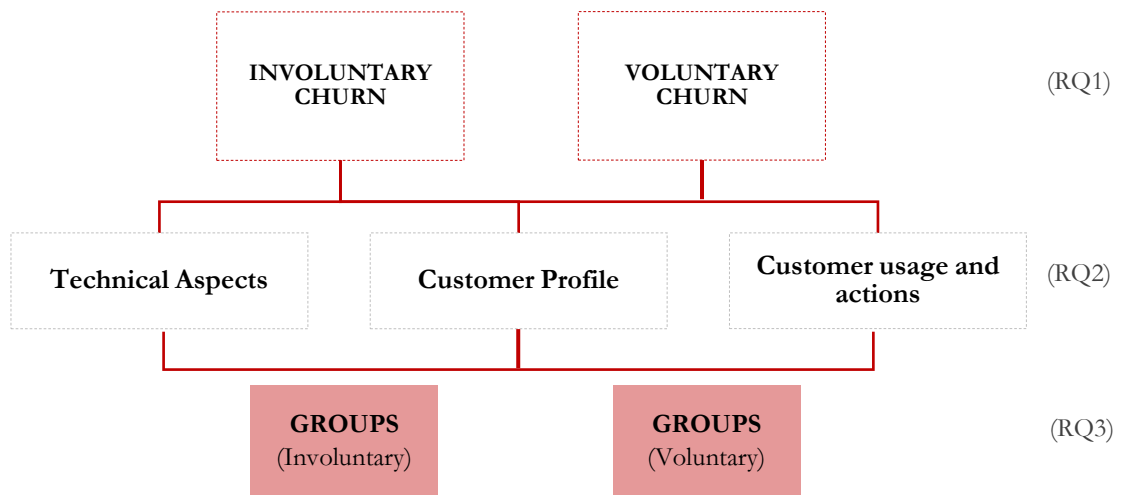


Figure 1: Research Design

¹¹ This “pattern matching” technique (Yin, 2003) was previously explained in Section 2 of this chapter.

¹² Annual Churn Rate = $\frac{\text{Number of customers who have left the company during 2020}}{\text{Average of the monthly customer base}}$. It gives the percentage of customers that NOS have lost during 2020.

IV. RESULTS

This section presents the analysis and discussion of the research results, according to the research questions initially proposed. For reasons of confidentiality, every churn rate was transformed into a 1-based index. For each variable under analysis, the most representative category in the total churn assumes a churn index of 1. Every churn rate that is higher (lower) than that category, assumes an index above (below) 1.

1. RQ1: What types of customer churn exist?

From the analysis of archival records, as well as from the informal meetings the author attended during the initial stage of the internship, it was clear that NOS's churn management was divided according to two different types of churn. In addition, there were two principal characteristics that were always taken into account when analyzing these types of churn: the level of seniority and the binding period. Therefore, to have a better overview of this phenomenon, they are briefly explained in this section.

1.1. Types of customer churn

As it was described in the Literature Review chapter, churn can be of several types, depending on the author and perspective of analysis. NOS usually identifies two types of customer churn: voluntary and involuntary. The former (voluntary) happens when a customer willingly abandons the relationship with NOS, while the latter (involuntary) represents the moment when NOS ceases the contract, due to non-payment.

Voluntary churn is usually a more complex and disturbing phenomenon, not only because, in the case of NOS, its churn rate is 2.5 times bigger than involuntary churn, but also because it is more difficult to anticipate and mitigate it.

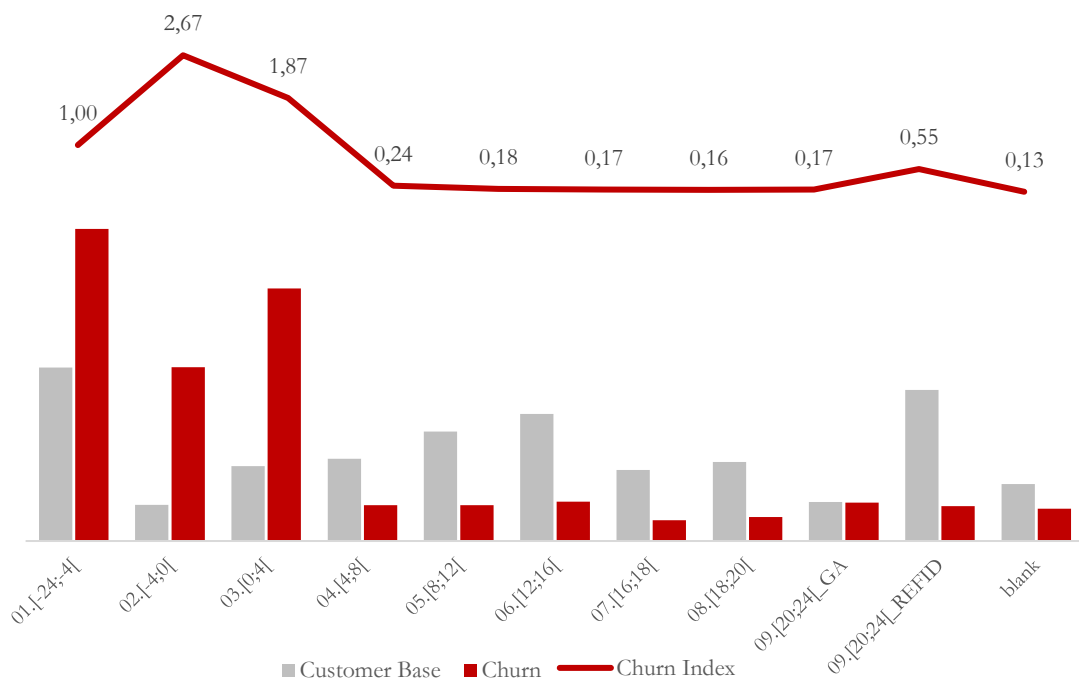
There are some particularities of each type of customer churn and, therefore, the characterization and further segmentation must be done separately. The analysis of these types of churn, in Section 2, is composed of different layers, from a macro to a micro-perspective of the relationship with customers.

1.2. Voluntary Churn

Voluntary churn happens when customers show willingness to abandon the relationship with a company, and they enter a retention process where they are given better alternatives, usually at lower prices, in order to avoid them from switching to competitors. After that retention process, if they still want to leave, they must formalize it at a store or by registered letter.

The main factor associated to this type of customer churn is the binding period, that is usually 24 months, in which the customer cannot cease the contract unless it pays early termination fees. Therefore, it is crucial to understand how voluntary churners are positioned within this period – whether they are close or not to the end.

Graph 1: Voluntary churn by binding period¹³

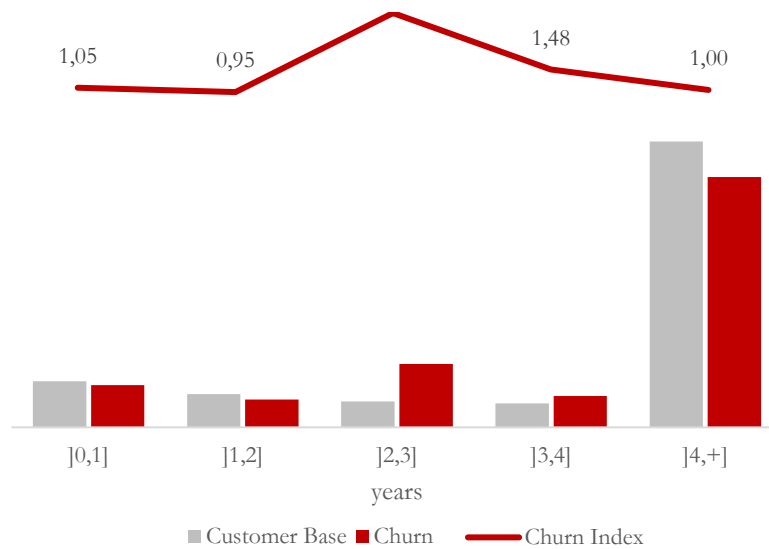


73% of voluntary churn is at the end of the binding period (classes 1 to 3 – Graph 1) and these are the ones with higher churn indexes. Moreover, those who have become clients 4 months ago or less also have higher likelihood to churn. Therefore, in the analysis of this type of churn, clients must be divided into two different groups, according to the remaining binding period – longer or shorter than 4 months.

¹³ Each class represents the time span until the end of the binding period. Classes 9 include new clients ([20;24[_GA) and those who have just renewed the contract ([20;24[_REFID) and, thus, have 20 to 24 months until the end of the binding period.

Regarding the level of seniority, which is related to the binding period, despite the majority of these clients being above 4 years old, the higher churn rates correspond to those that are between 2 and 3 years old – which represents the end of the first binding period. Actually, there is a peak of clients leaving NOS between 23 and 26 months of seniority, meaning that the moment of the first contract renewal is decisive to customer retention.

Graph 2: Voluntary churn by seniority class



Henceforth, the analysis will be divided into two groups, according to the remaining binding period (RBP):

- Group 1 includes clients who are already out of the binding period or close to its end and is the most representative one (RBP < 4 months).
- Group 2 is bound by the terms of the contract and, consequently, is less likely to churn (RBP > 4 months).

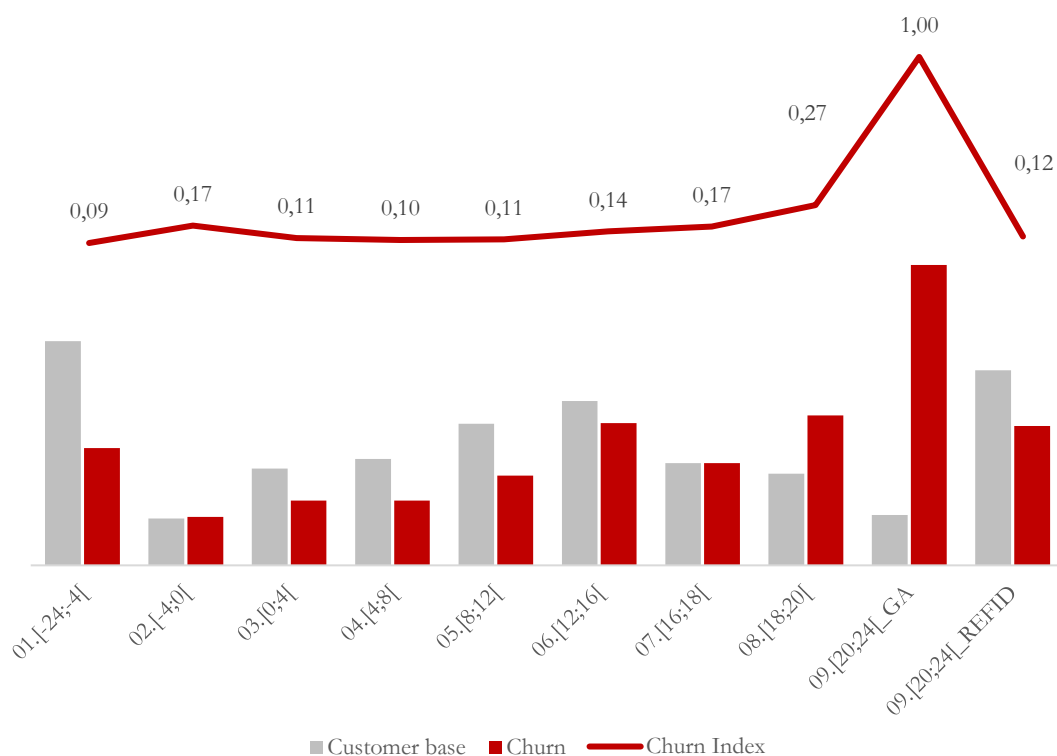
1.3. Involuntary Churn

Companies from the telecommunications industry, as well as from other service industries, usually have problems collecting customer invoice payments, which leads to involuntary churn. To alleviate these difficulties, they have established a dunning process, in which the customer receives communications about the late payment. This process follows a timeline, starting from the due date, and, in the case of NOS, might last up to 4 months, until the service cutoff. At the beginning, the customer receives reminders in the format of Short

Message Services (SMS), emails or Interactive Voice Responses (IVR). If the customer still does not pay, NOS takes stronger procedures, such as service cutoffs or legal actions. After 3-4 months and several communications, there is the final cutoff and the customer is considered involuntary churn. Therefore, the further analysis takes into account a time period of 4 months to establish a relation between some events and the moment of churn.

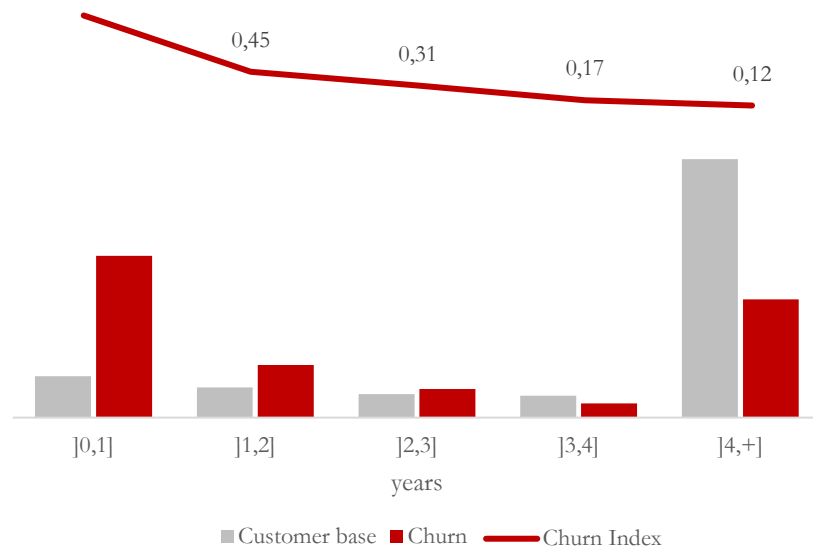
In contrast to voluntary churn, involuntary one is not linked to the binding period because, in this case, it is not the client who ceases the contract. However, it is possible to realize some important differences between these two types of churn (Graph 3). 25% of involuntary churn are new clients, who have made the contract in the last 4 months before churn, which might indicate that those clients were not satisfied with the conditions proposed by the sales assistant. In addition, by taking a look at the churn index, clients who are far from the end of the binding period (e.g., level 8 and 9) have higher churn indexes.

Graph 3: Involuntary churn by binding period



When comparing the customer base with the customer churn, regarding the level of seniority, it is possible to identify a different pattern. Firstly, 43% of this churn is less than 1 year old, which means they are customers that decide to leave the company shortly after being acquired. Secondly, the churn index is much higher for this level of seniority.

Graph 4: Involuntary churn by level of seniority (years/months)



Therefore, henceforward, from the business understanding and the analysis of these two characteristics, it is reasonable to divide involuntary churn into the following groups:

- Group 1: includes clients that have initiated the contract in the last 4 months (that is, level of seniority lower or equal to 4 months) and, possibly, have not paid any invoice yet¹⁴.
- Group 2: clients who are above 4 months old and, consequently, the moment of churn is less likely to be related to the sales procedure.

2. RQ2: What are the main variables associated with customer churn?

Knowing the two types of customer churn and how they should be analyzed, it was possible to identify key variables relative to different spheres of the customer journey and relationship with NOS.

Firstly, there were technical aspects, including the technology and the equipment models, that could have an impact in customer churn by affecting the service quality.

¹⁴ Note that it takes around 4 months for a customer to be considered involuntary churn after stopping paying invoices.

Secondly, the customer profile, which encompasses the number of products/services the client possesses, might or might not increase customer engagement and, consequently, diminish customer churn.

Lastly, customer usage and actions – e.g., the level of TV viewing, mobile data usage, number of complaints, attendance to retention actions – might indicate the level of usage and satisfaction with the services provided, helping NOS anticipating customer churn.

The variables analyzed under each of these three topics might be different for voluntary and involuntary churn since, as it was explained before, they have different contexts and motivations.

2.1. Voluntary Churn

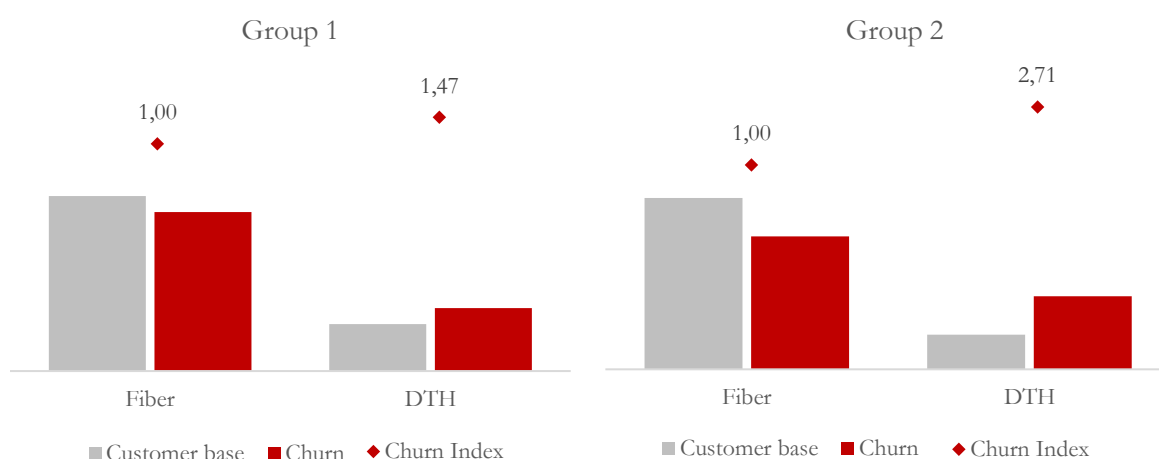
i) Technical characteristics

When it comes to technical characteristics, which are the superficial layer of the customer relationship, the most relevant were found to be the set-top box technology, the television model and the type of router.

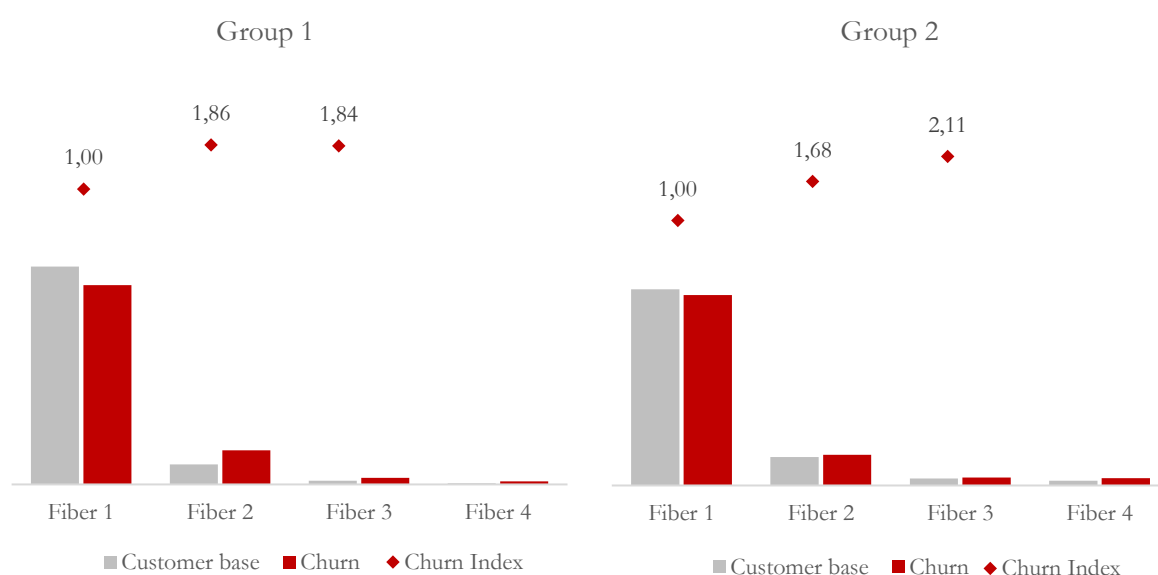
Concerning the set-top box technology, when comparing clients that have churned with the current customer base, the impact of the older satellite TV (DTH¹⁵) on customer churn is clear in both groups. Actually, the churn index is higher in DTH clients, which means that customers with satellite TV are more likely to churn than those with cable TV (Graph 5). In addition, when it comes to cable TV, the vast majority of churners have Fiber 1 technology – the oldest one –, which appears to have a better performance, comparing to other technologies (Graph 6). These conclusions apply to both groups of clients, regardless of the remaining binding period.

¹⁵ Direct-to-home: The signal is directly beamed to the TV set through a receiver (antenna/dish) that is installed in the house, without a separate cable connection.

Graph 5: Churn index for DTH and fiber-based services



Graph 6: Churn index by technology

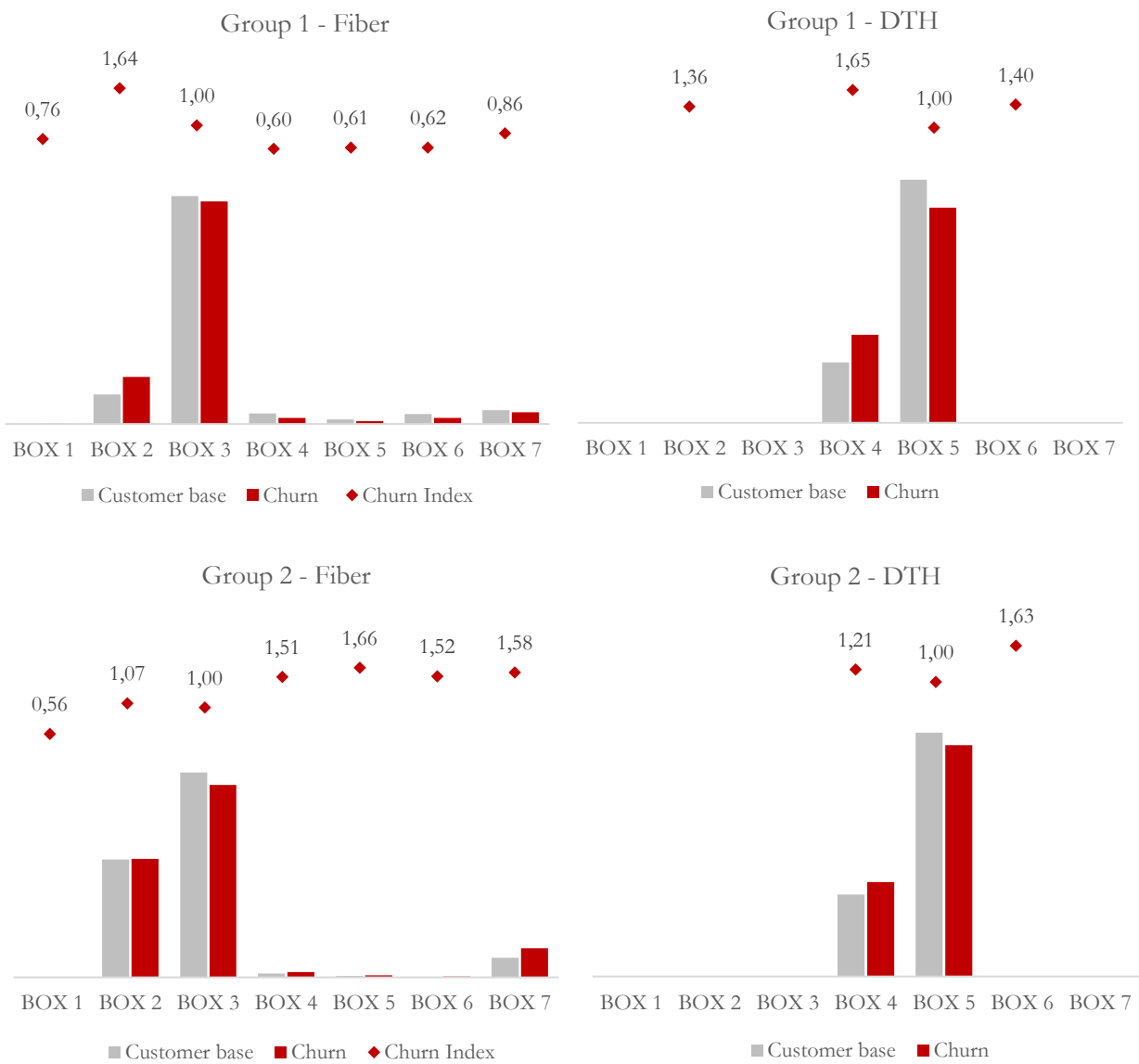


Voluntary churn is also linked to the clients' equipment. Clients who churn have a higher percentage of more recent equipment, both box and router. In the case of the box equipment, it is important to analyze separately DTH and fiber clients, because the models are different.

Clients with more recent equipment tend to be within a binding period (e.g. BOX 2 is the second latest model and represents 34% of these churners, comparing to 16% of clients outside of that period). However, the first group of clients has higher churn indexes for both

fiber’s and DTH’s most recent models (Graph 7¹⁶). On the contrary, clients that are still within the binding period have higher churn indexes for the oldest box models.

Graph 7: Churn index by box model

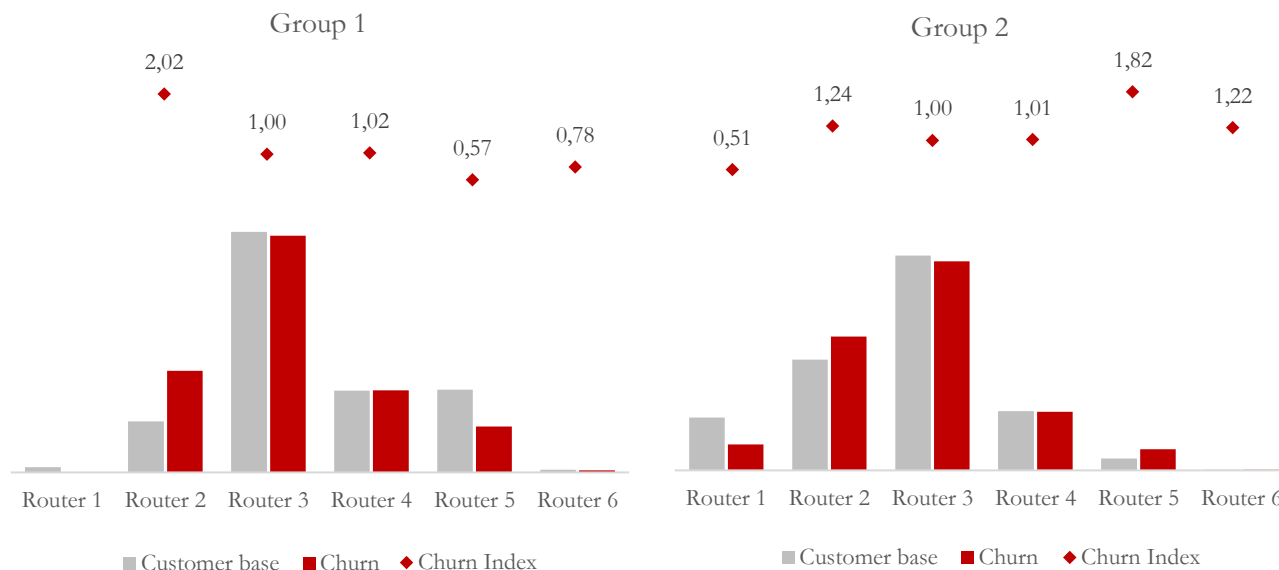


The router presents the same type of pattern as the box model, since clients who are at the end of the binding period have higher churn indexes for the latest models. Clients from Group 2, on the contrary, though they have a higher percentage of more recent equipment,

¹⁶ Models are sorted by launch date from the latest to the oldest ones.

Router 1 (the latest model) has the better performance regarding the likelihood of churn (Graph 8¹⁹).

Graph 8: Churn index by router



ii) Customer Profile

When it comes to the relationship between NOS and its clients, it is crucial to understand the number of basic and value-added services and whether there is or not an association between them and customer churn. This is usually called the client's profile¹⁷ and includes 1 to 5 basic services which, including the value-added services, might all add up to 14 products/services. Related to the client's profile is the client's Average Revenue per Unit (ARPU), consisting of the average amount paid by clients each month.

Burnett (2014) has already established a correlation between bundled services and switching behavior, proving that those clients are less likely to churn than standalone ones.

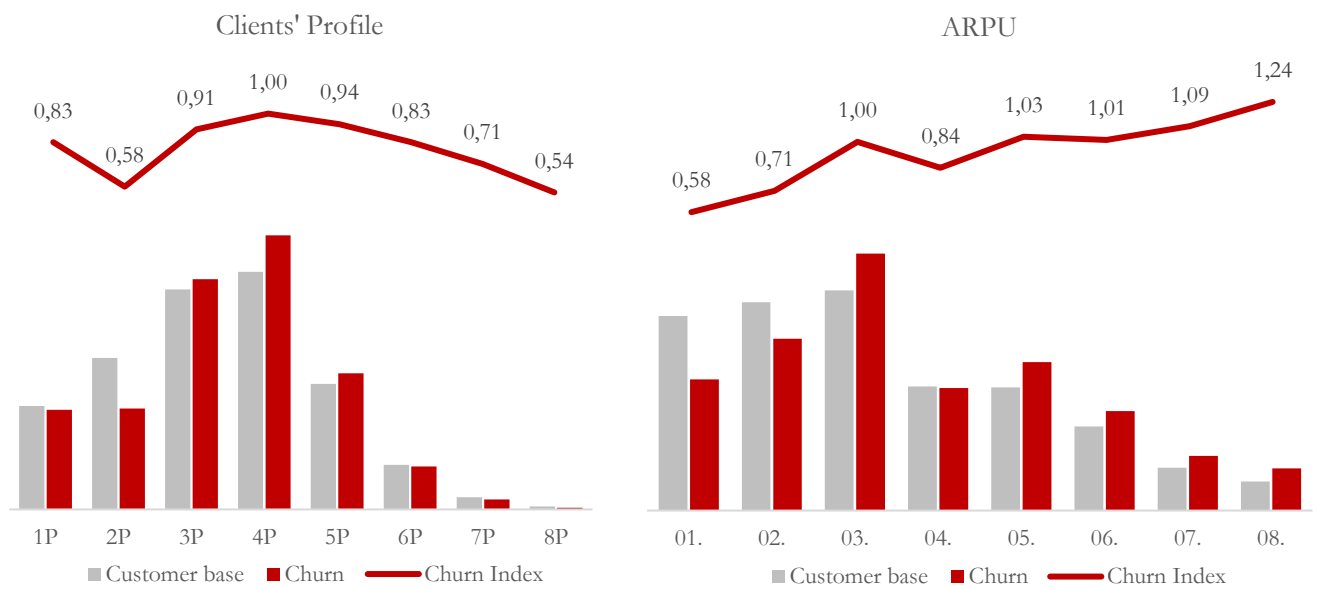
Besides, the more products/services the clients have (the higher ARPU¹⁸), the lower the churn index tends to be, confirming findings by Gosselin (2017) and Keaveney (2001). This

¹⁷ A profile of 1P means that the client has only 1 service (TV or Net). Each additional "P" represents one additional service. Basic Services: Television, Fixed Internet, Mobile Internet, Fixed Voice, Mobile Voice. Value-added services: Multiroom (more than one TV box), Apple TV, Rented router, Usage of NOS card, Video club, Premium Sport Channels, Other premium channels, Wi-Fi Range Extenders, SVODs, Payments of Equipment in Installments, Mobile Phone Insurance.

¹⁸ For reasons of confidentiality, the levels of ARPU can not be disclosed, but are sorted in ascending order in Graph 9 and 10.

pattern is more visible in clients from Group 2 (Graph 10), although it is also observable for clients who are outside of the binding period (Group 1 – Graph 9). However, these clients present higher churn indexes for higher levels of ARPU (Yuan et al, 2019; Soomro et al, 2020), in comparison with Group 2. More products/services, especially those value-added, means that the client has a stronger relationship with the company and, consequently, has less incentives to switch to competitors. In addition, clients from Group 2 with lower ARPU may be price sensitive and, thus, more likely to constantly seek more attractive offers.

Graph 9: Churn index by client's profile and level of ARPU – Group 1

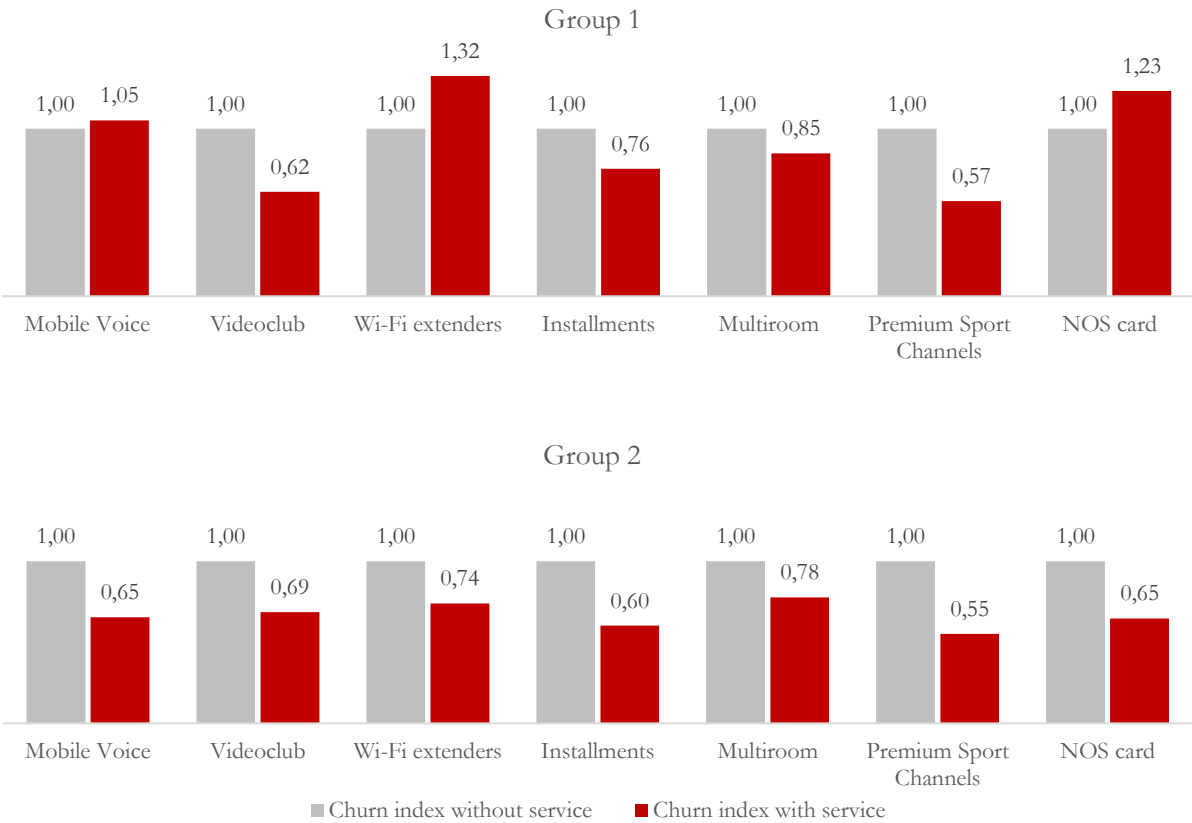


Graph 10: Churn index by client's profile and level of ARPU – Group 2



In addition, when considering each product/service individually, a mitigating effect in customer churn remains, both for clients inside and outside of the binding period (Graph 11). This pattern is especially apparent in clients from Group 2 and in the case of premium sport channels and clients who buy equipment in installments, since the churn index for clients with those services is much lower than those that do not have them. As it was expected, clients with mobile voice have also lower churn indexes (García-Mariñoso & Suárez, 2019). For clients who are at the end of the binding period, Wi-Fi extenders and NOS card do not have such positive impact on reducing customer churn.

Graph 11: Churn index for clients with and without each product/service



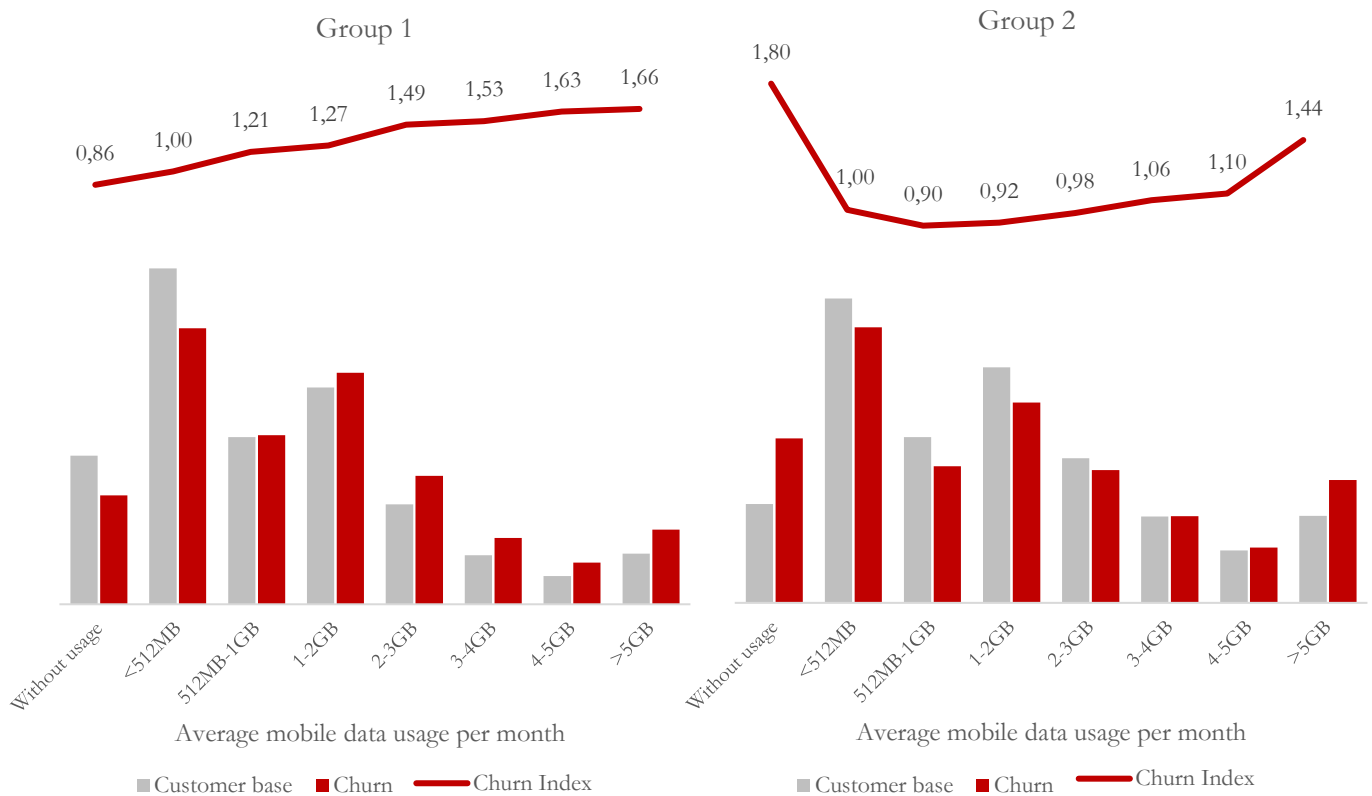
ii) Customer usage and actions

Another layer of the customer relationship is the behavioral one, especially regarding TV viewing and mobile data usage.

For clients from Group 1, there is a positive association between mobile data usage and the churn index, because the more they use, the higher the churn index is. When it comes to Group 2, clients who own a mobile SIM card but do not use mobile data, or those who use

the most (more than 5GB per month), have higher churn indexes than those with moderate usage (Graph 12). Ahn et al (2006) also found out that heavy-users are price sensitive, thus being more likely to churn.

Graph 12: Churn index by level of mobile data usage



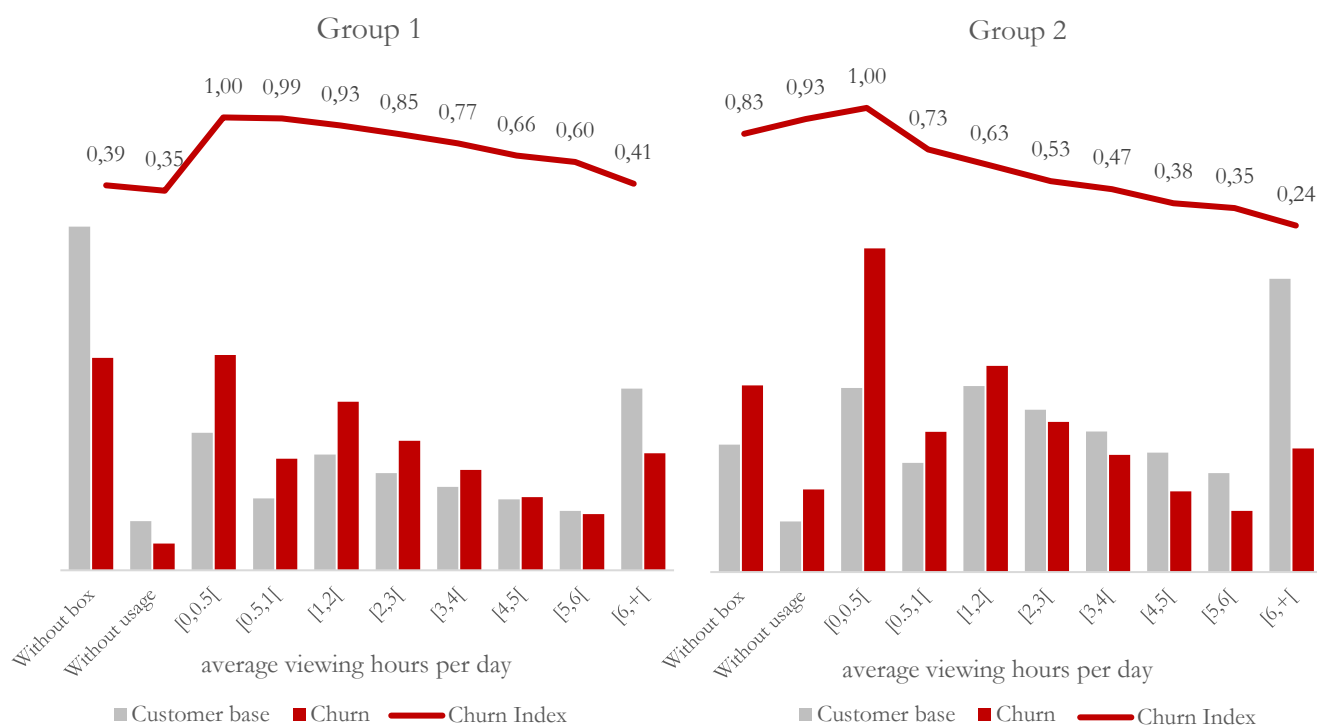
On the contrary, regarding TV viewing¹⁹, there is a negative association between hours of viewing and the churn index, for clients both from Group 1 and 2 (Graph 13Graph 12²⁰)—those who have higher viewing habits have less propensity to churn, which might happen because this increases the relationship with the service provider (Uner et al, 2020).

In addition, 24% of voluntary churners tend to use television until the churn month, whilst only 2% of them use mobile data in that period (Graph 14.2). The last month of usage records a decrease in TV viewing – 52% of customers decrease their usage by more than 50%. On the contrary, mobile data usage does not have a clear pattern before churn, since half of the customers reduce, while the other half increase their usage (Graph 14.1).

¹⁹ Only applicable to fiber-based services, because DTH equipment is not able to register the client's usage.

²⁰ Average viewing hours per day in the last 6 months before churn.

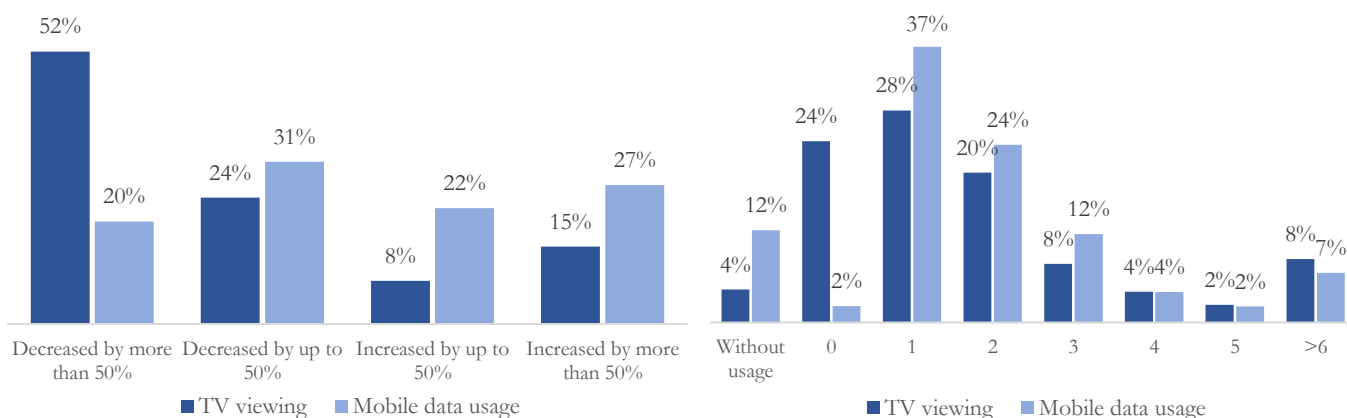
Graph 13: Churn index by level of TV viewing (only for fiber-based services)



Graph 14: Comparison between the usage pattern for TV viewing and mobile data before the churn month

14.1. Variation²¹ in the usage pattern before churn

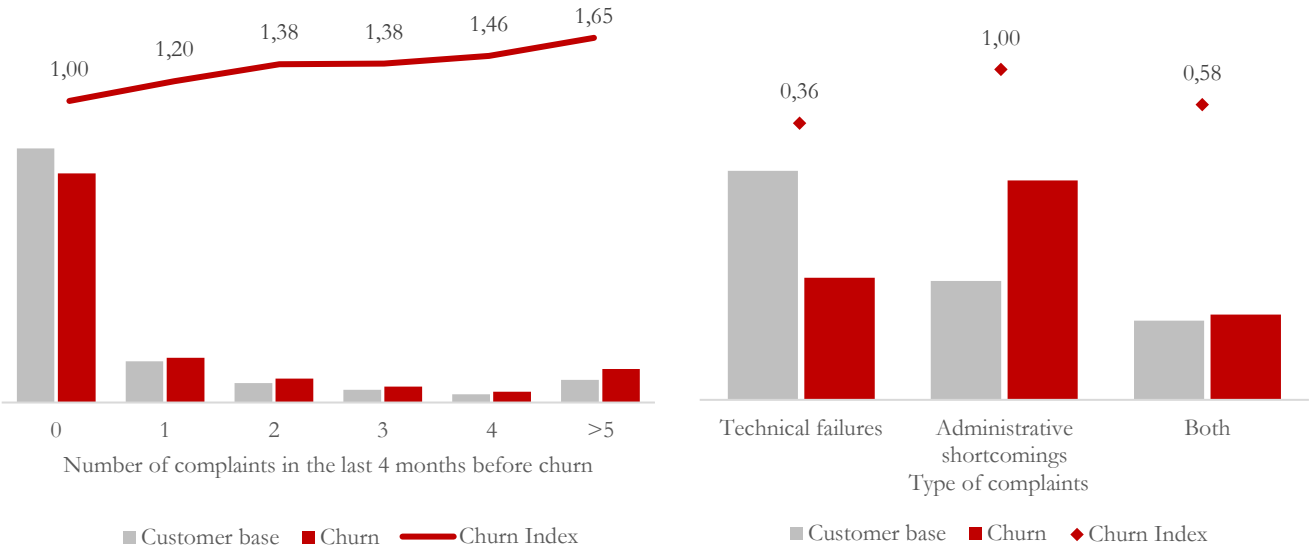
14.2. Number of months without usage before churn



²¹ Comparison between the last month with active usage and the two months before that.

Complaints in the Customer Service also have a positive association with customer churn, though not every churner expresses their dissatisfaction. Actually, 64% of voluntary churners do not report problems in the last 4 months before the moment of churn. The more complaints clients make, the higher is the churn index (Ahn et al, 2006). Besides that, administrative shortcomings²² develop a higher level of dissatisfaction comparing to technical failures, in the sense that customers with such type of complaints also have higher churn indexes (Graph 15).

Graph 15: Churn index by number and type of complaints

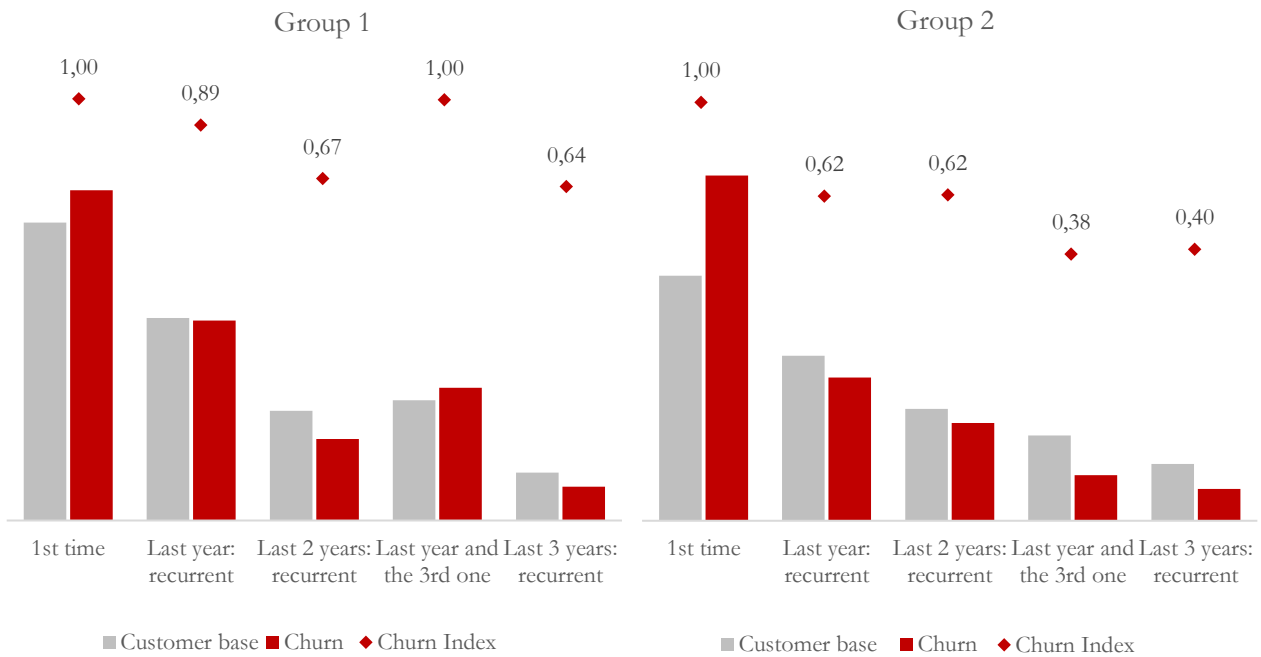


As it was mentioned before, retention actions are one of the particularities of voluntary churn, and a key component of telecommunications companies’ strategies. Clients who attend this type of actions for the first time in the last 2 months have a higher churn index²³ than those who pass through it regularly in the last 3 years – at least two times the last year, one time the year before and another the third year. (Graph 16).

²² Complaints in Customer Service were categorized by subject matter into “Technical failures” (e.g. unstable internet connection, TV reboots) and “Administrative shortcomings” (e.g. improper billing). See Appendix 2 for more examples.

²³ In this case, the churn index was not calculated by the annual churn rate. It represents the monthly likelihood of customers who, for example, have gone to retention actions for the first time, being churn.

Graph 16: Churn index by recurrence of retention actions



2.2. Involuntary Churn²⁴

i) Technical Characteristics

Regarding the set-top box technology (Graph 17), there are some differences between the two groups of involuntary churn. Firstly, the majority of clients who stop paying invoices right after the beginning of the contract – and become involuntary churn up to 4 months after that (Group 1) – have DTH services, while older clients have predominantly fiber services. Secondly, the difference between the churn indexes for DTH and fiber services is bigger in Group 1, although in both groups the churn index is higher for DTH services.

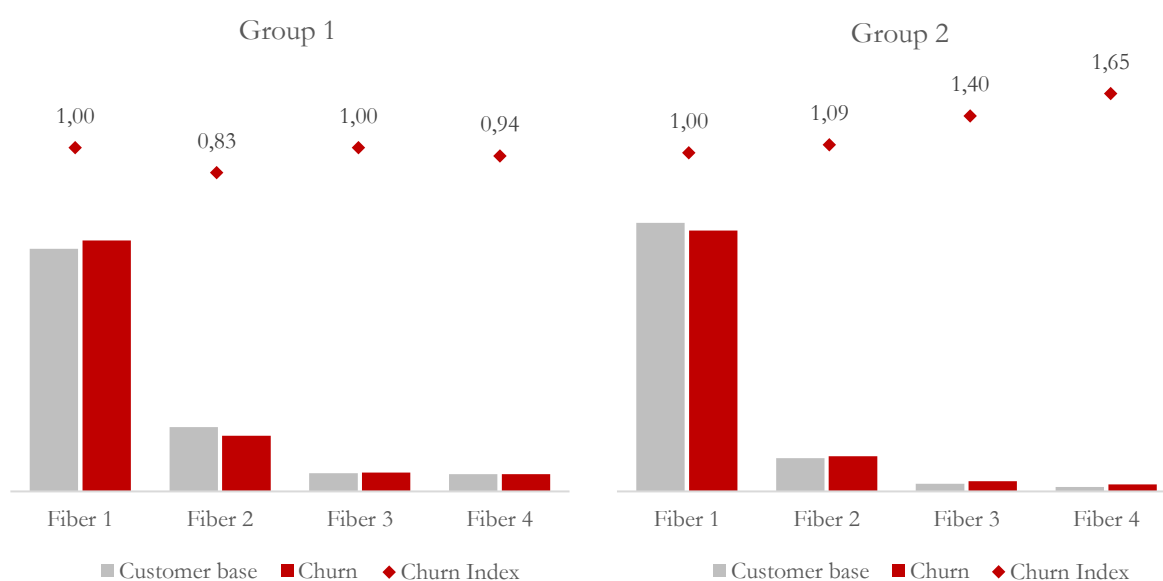
In addition, when it comes to fiber-based services, the Fiber 1 technology – which is the older one – has a better performance comparing to more recent technologies, with a lower churn index, especially visible in Group 2, which is the most representative one. Besides, clients who are less than 4 months old (Group 1) are more concentrated in Fiber 2, 3 and 4 services than clients from Group 2 (Graph 18).

²⁴ Involuntary churn was interrupted on April 2020, due to the temporary consumers' protection measures facing the covid-19 pandemic, as explained in Chapter 2. Therefore, the analysis includes data from 2020, except for April.

Graph 17: Churn index for DTH and fiber-based services



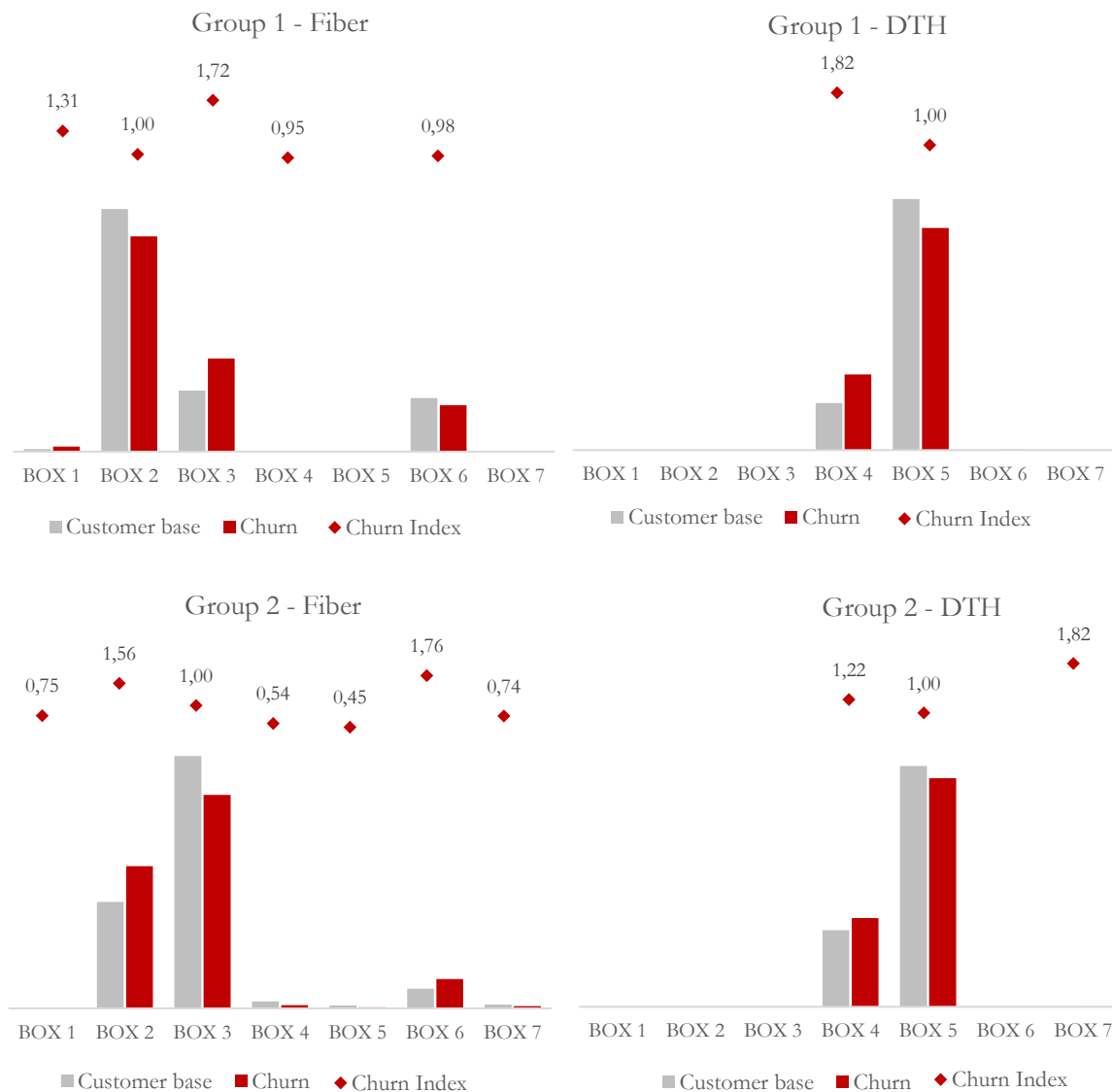
Graph 18: Churn index by technology



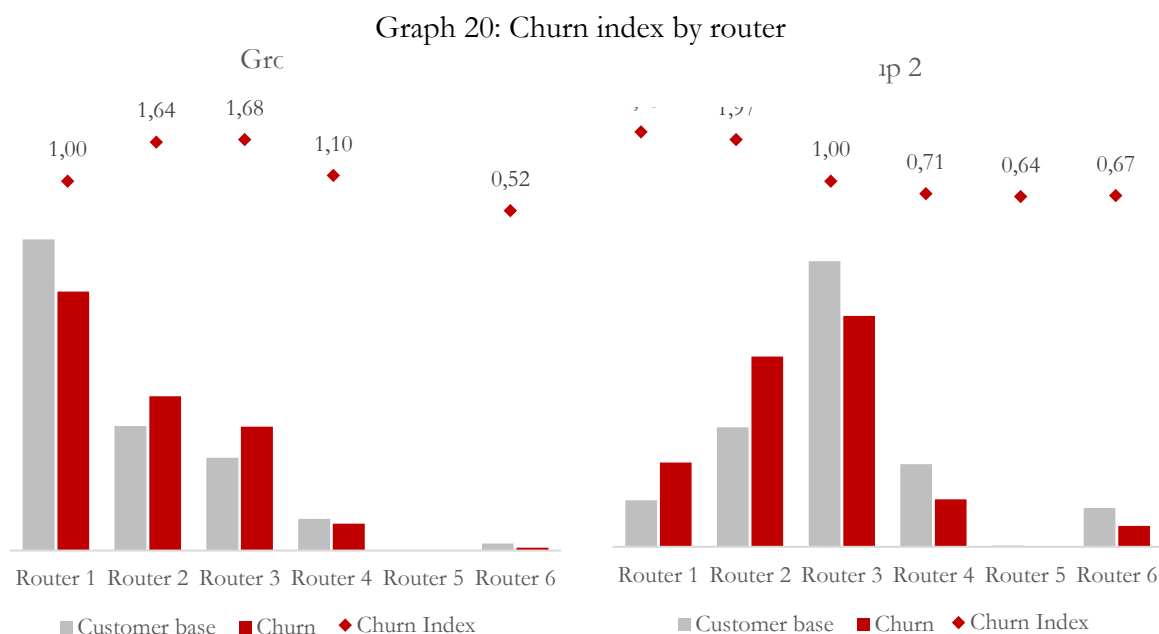
In contrast to voluntary churn, the vast majority of involuntary churn is within the binding period and 25% consist of new clients (Group 1), which explains the higher concentration of the latest box models (especially BOX 2 in fiber-based services). However, clients from that group who have BOX 3 present higher churn indexes than BOX 2. On the contrary,

clients from higher levels of seniority (Group 2) have a higher churn index for BOX 2 than BOX 3. DTH clients have similar results for both groups with BOX 4 recording the highest churn index. Summing up, there seems to be no relevant association between involuntary churn and the box model, under the business standpoint.

Graph 19: Churn index by box model



Concerning the router, newest clients have, again, the latest equipment, while the higher churn indexes correspond to the oldest models. The pattern for clients from Group 2 highlights that the newer the equipment, the higher the churn index.



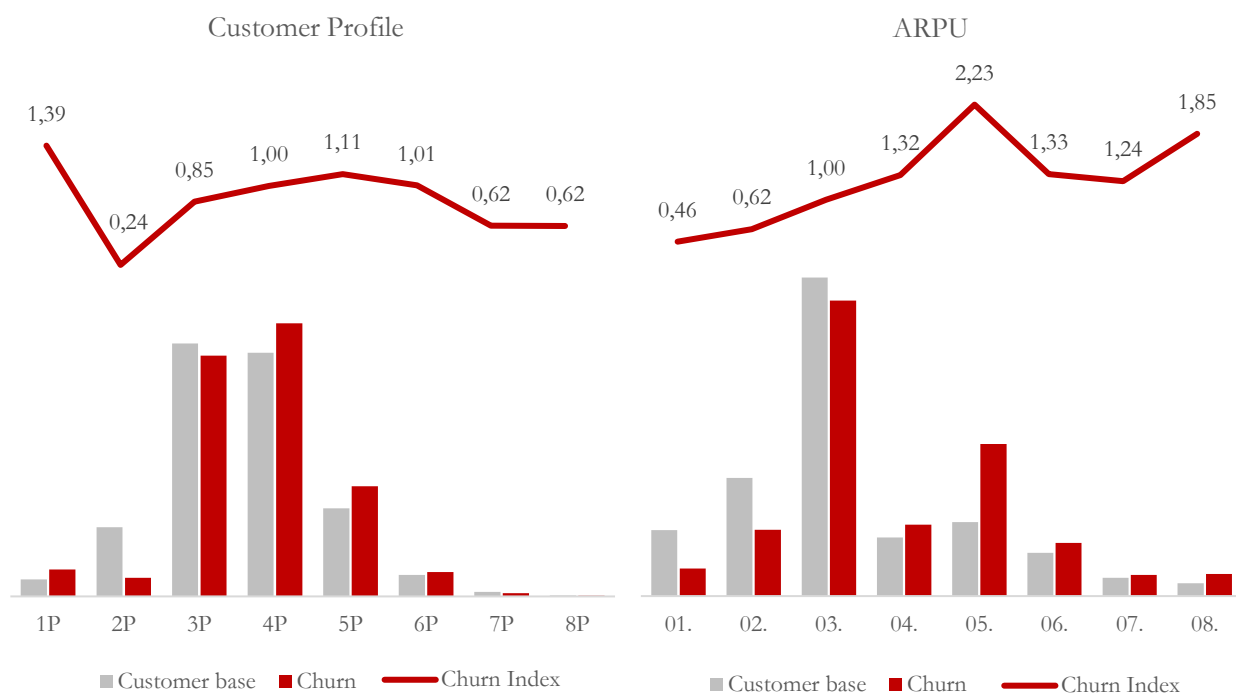
iii) Customer Profile

As it happened with voluntary churn, the more products/services the clients have, the lower the involuntary churn index tends to be, suggesting that some products/services might have a mitigating effect in customer churn, though this tendency is more apparent in Group 2.

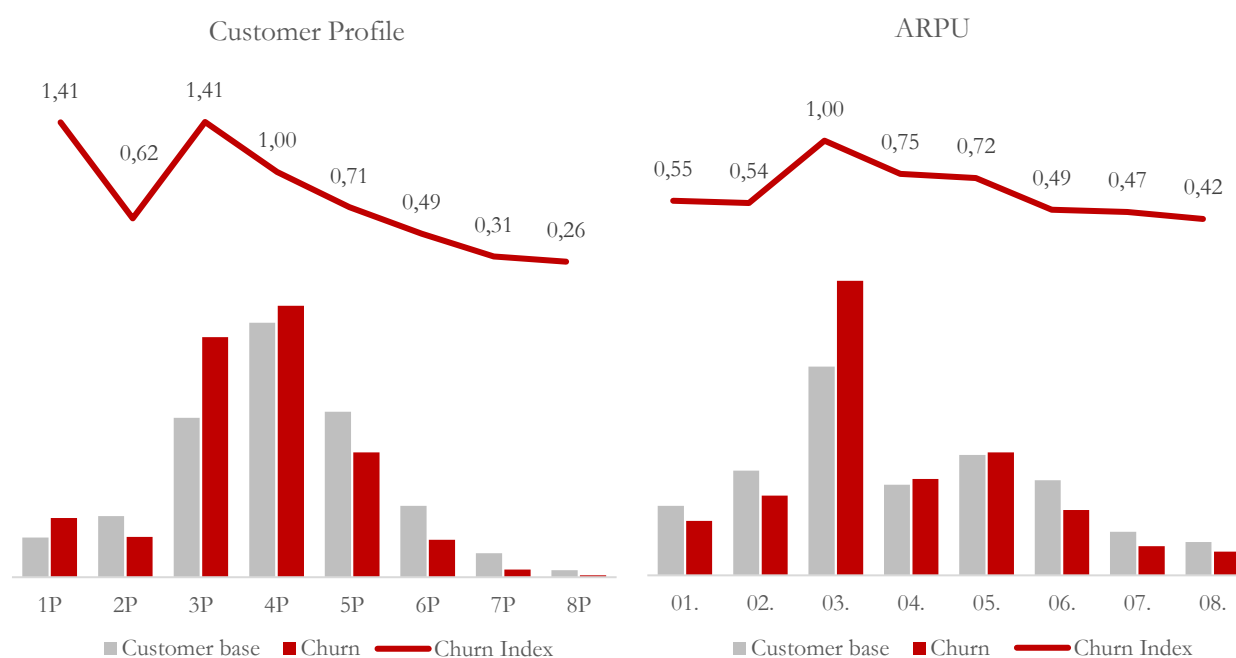
The negative association presented between voluntary churn and the level of ARPU²⁵ is still visible in involuntary churn (Group 2), indicating that clients who pay a lower monthly charge have a higher propensity to stop paying the invoices. On the contrary, new clients (Group 1) present a different pattern – the higher the ARPU, the higher the churn index (Yuan et al, 2019; Soomro et al, 2020).

²⁵ For reasons of confidentiality, the levels of ARPU can not be disclosed, but are sorted in ascending order in Graph 9 and 10.

Graph 21: Churn index by customer profile and level of ARPU - Group 1



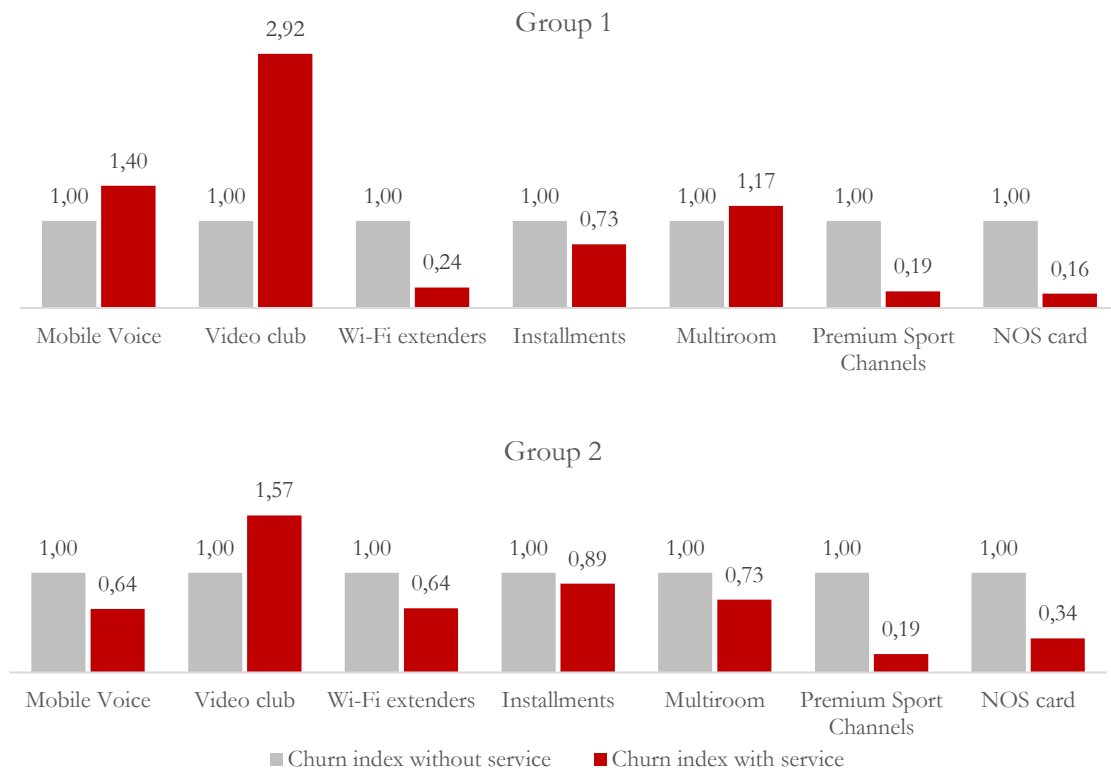
Graph 22: Churn index by customer profile and level of ARPU - Group 2



Following the logic of churn reduction arising from the increase in the bundled products, the churn mitigating effect of each product/service individually is still visible in the case of involuntary churn. Clients with these services, both from Group 1 and 2, (Graph 23) have

lower churn indexes than those without them, except for video club, mobile voice and multiroom.

Graph 23: Churn index for clients with and without each product/service

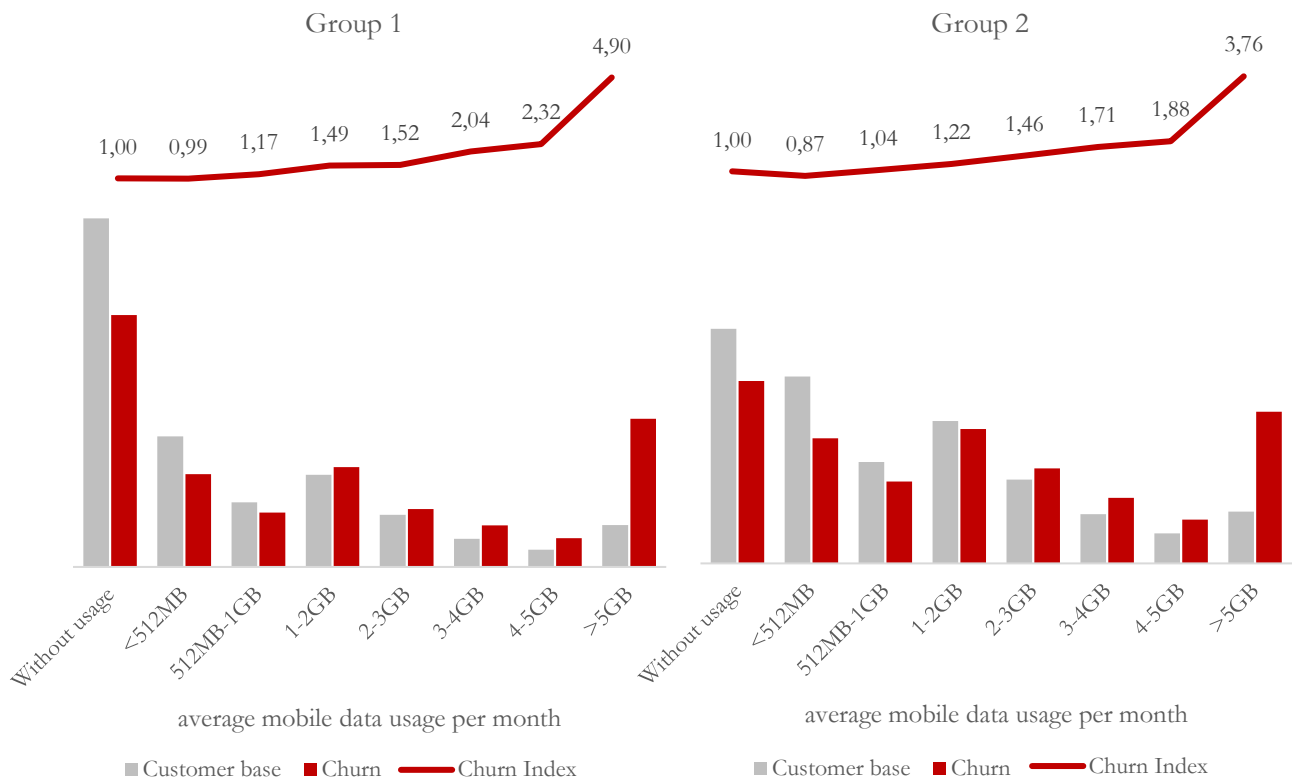


iv) Customer usage and actions

Like it was explained by Ahn et al (2006), heavy users might be price sensitive and, consequently, more likely to churn than light users. Actually, in the case of mobile data usage²⁶, it is true for both groups of involuntary churners – the higher the level of usage, the higher the churn index (Graph 24). This might be explained by the different monthly download limits of 1GB, 2GB, 5GB, among others. Heavy-users must opt for higher limits, that correspond to more expensive tariffs and, thus, are more prone to look for more attractive offers. It is also important to note that 20% to 30% of involuntary churners who have a mobile card does not consume mobile data.

²⁶ Average mobile data usage per month, in the last 6 months before churn.

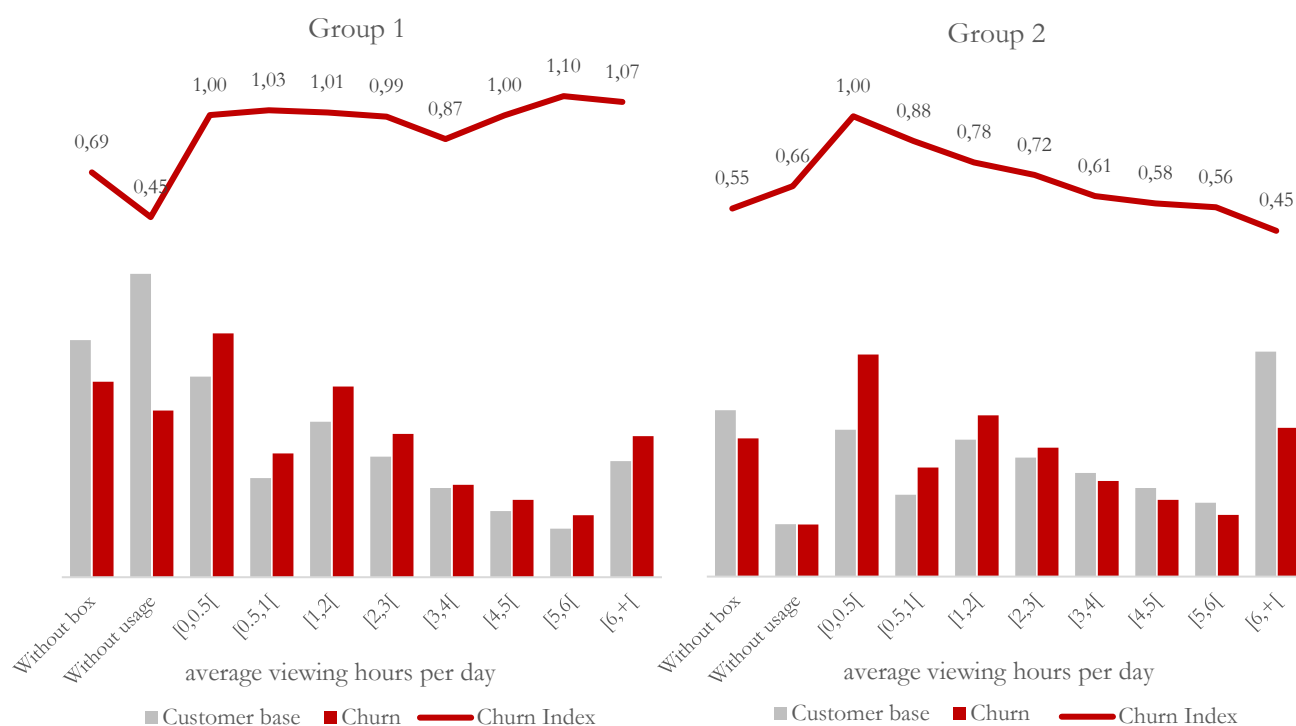
Graph 24: Churn index by mobile data usage



On the contrary, TV viewing²⁷ has not limits and there is not an increase in price if the client is heavy-user. Therefore, the “price sensitive” argument (Ahn et al, 2006) does not apply to this case. Firstly, there are some differences between Group 1 and 2 such as, for example, the percentage of non-users that is much higher in new clients – 12% of those who have BOX have never watched TV. Secondly, the pattern of the churn index of Group 1 is very different from the one of Group 2. The former does not show an association between TV viewing and customer churn, while the latter indicates that the more time clients spend watching TV the less the churn index, which is similar to Uner et al (2020) findings about mobile usage.

²⁷ Average viewing hours per day, in the last 6 months before churn. Only applicable to fiber-based services, because DTH equipment is not able to register the client’s usage.

Graph 25: Churn index by TV viewing (only for fiber-based services)



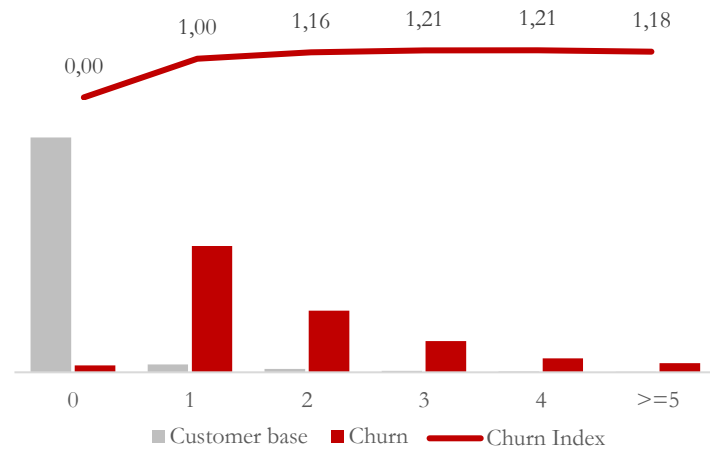
As it was explained in Section 1 of this chapter, the main component of involuntary churn is the dunning process, which is triggered whenever a customer fails to pay. As it was expected, almost every client defaults before being involuntary churn and the more times the client defaults²⁸, the higher the churn index (Graph 26). It is also important to note that 25% of these clients has already agreed on payment arrangements²⁹, which means that they have already failed to pay at least once before.

The association between complaints in the Customer Service and involuntary churn is similar to the one found in voluntary churn, although the increase in the churn index resulting from the increase in the number of complaints is not so big as it was for voluntary churn. In addition, administrative shortcomings generate more dissatisfaction and more churn than technical failures, like it happened with voluntary churn.

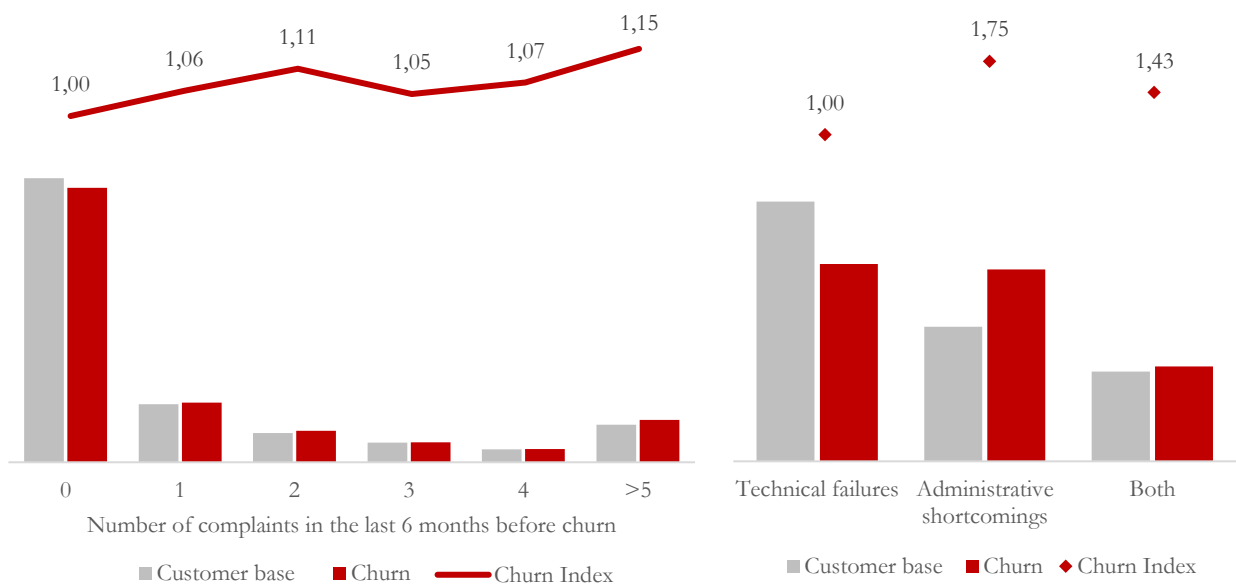
²⁸ For the purpose of this study, the number of times a client defaults was measured by the number of SDs (soft disconnects) in the last 9 months before churn. SD corresponds to the moment of the first cut off, happening 50 days after the beginning of the dunning process. After that, if the client does not pay, there is a HD (hard disconnect after 20 days) and the FD (final disconnect after 15 days).

²⁹ When a client enters the dunning process, it may ask for a payment arrangement, in which the outstanding debt will be paid in 12 installments at most.

Graph 26: Churn index by recurrence of default



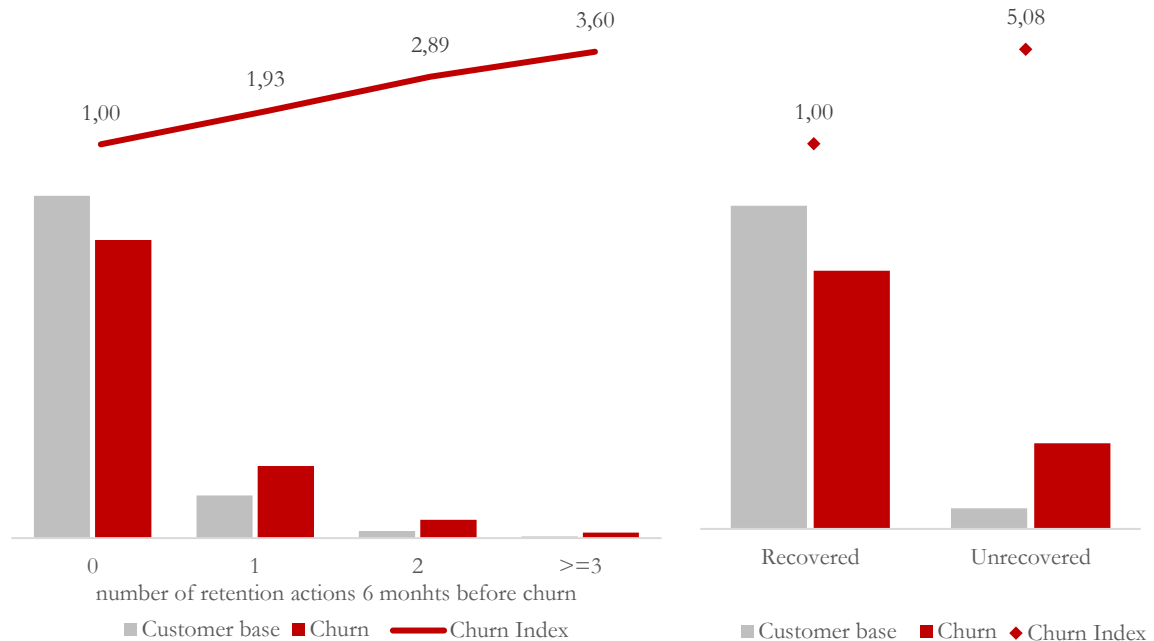
Graph 27: Churn index by number and type of complaints



Although a client does not have to demonstrate their intention to cease the contract to become involuntary churn, in contrast to what happens in voluntary churn, there are still some of them who do and, consequently, are submitted to retention actions. From the 20% who pass through retention actions, 72% are marked as “Recovered”³⁰ by the responsible assistant, ending up leaving NOS (Graph 28).

³⁰ Each time a client attends a retention action, the assistant marks the result as “Recovered” or “Unrecovered”, whether the client accepts the conditions and agrees in fulfilling the contract or not. In this case, the result corresponds to the last retention action before churn.

Graph 28: Churn index by the number and result of retention actions



3. RQ3: How can churners be segmented?

Taking into account the findings from RQ2, churners were segmented to highlight the main groups of clients. The “pattern matching” technique (Yin, 2003) was used again – firstly, by comparing the distribution of the groups in the customer base and in the customer churn and, secondly, by analyzing the distribution of the main variables in each segment, in comparison with the total churn. In addition, the annual churn rate for each group of customers was calculated and then transformed into a 1-based index.

The criteria for the segmentation will be explained for each group, and the process consisted of an iteration, that is, the repetition of a process – i.e., if the client fulfills the first criterion, it enters to the first group, if not, it skips to the next one. Segments are described in the order of the iteration.

3.1. Voluntary Churn

i) Migrations

One phenomenon associated both with voluntary and involuntary churn is migrations of technology³¹. Sometimes, the change of technology is not properly registered as a migration,

³¹ It occurs when a client switches from DTH to fiber services.

and clients might unduly end up as voluntary churn, while still being a NOS's client. Although, this group accounts only for 1% of the total voluntary churn, it represents 2% of DTH voluntary churn and, consequently, must be isolated at the time of the segmentation.

ii) Competitive change

There are only a few DTH customers in the total customer base, comparing to fiber ones, since, after the development of the fiber-optic network – with numerous advantages especially concerning network speed and stability – customers are migrating from DTH to fiber-based services. Therefore, DTH voluntary churn might be triggered by the installation of fiber-optic network in the household – by NOS or another competitor³².

To identify this group of clients, it was necessary to identify which parishes were covered with fiber-optic network in 2020³³. Then, to validate the rationale, that information was crossed with the monthly churn rate for each parish in order to determine whether or not there was an increase on the churn rate at the moment of the installation. The conclusion of this methodology proved that the churn rate used to increase 1.5 times on the month of the installation and that increase extends until 3 months after. Consequently, parishes that fulfill that requirement (have an increase in the churn rate of 1.5 times) were classified as having a “Competitive change” in that month.

Accordingly, DTH voluntary churn that happened in those parishes in those months enters to this segment of clients, which represents 5% of the total voluntary churn. In addition, churn that is due to competitive changes accounts for 17% of the total DTH voluntary churn. However, this group is very volatile, depending on the installation of fiber-optic – for example, during the first lockdown, this group is of very little relevance, increasing during the following months.

The majority of this group is outside of the binding period, making it more susceptible to competitive changes.

³² NOS and Vodafone signed a fixed network sharing agreement in 2018, meaning that whenever NOS increases the network coverage, Vodafone may also take advantage of that and, consequently, some clients might switch operator.

³³ To do this, the author used the records of installation of fiber-optic network by NOS and Vodafone as a proxy.

iii) 1st Opportunity Out

As it was described in section 2, there is an important part of voluntary churn that happens 24 to 26 months after the beginning of the contract. This corresponds to the end of the first binding period, which means that these clients leave NOS at the first opportunity. They might not be satisfied with the service and wait until the end of the binding period so that they would not have to pay early termination fees. This group represents 9% of the total voluntary churn and have one of the higher churn indexes, which indicates that the end of the first binding period must be a crucial moment for telecommunications companies to retain these clients, avoiding them to churn.

In comparison with the total voluntary churn, these clients have less complaints and tend to pass through less retention actions since the beginning of the contract, which indicates they do not signal their dissatisfaction before the end of the binding period. In addition, in the last 2 months before churn, 31% of these churners only send registered letter to cease the contract, which means they are less susceptible to retention actions.

iv) Deal seekers

As it was discussed in the Literature Review, deal seekers (Gallo, 2014) may at first seem the best customers by engaging in CRM programs and special discounts, but at the end might switch to a competitor with a more attractive deal. This segment includes clients who have pass through retention actions in the last 2 months recurrently, that is, at least, 3 times – one in the last two months, one in the 10 months before and another one in the second year.

70% of this group of churners is above 4 years old (in comparison with 60% of the total voluntary churn). As their name suggests, these clients are proved to get indeed better deals. On the one hand, the majority of these clients (74%) have a customer profile of 4P/5P³⁴, suggesting that these clients, who have gone to several retention actions, have been accepting retention offers with more services. On the other hand, these clients have a lower ARPU than the total voluntary churn, especially on higher customer profiles (e.g. deal-seekers with a 4P profile, and 4 mobile cards, pay 3.20€ less than the total voluntary churn).

³⁴ This customer profile only includes up to 5 basic services: Pay Tv, Fixed and Mobile Internet and Fixed and Mobile Voice.

v) Non-users

Many studies have been using customer usage to predict customer churn, and the relationship between those variables was already described in section 2. Actually, there was a considerable group of customers without mobile data usage or TV viewing, which might indicate a misalignment between the rate plan and the client's needs, which, in turn, might lead to customer churn. Therefore, those customers were grouped in this segment of non-users, that represents 6% of voluntary churn.

34% of these churners are under 1 year old and, more precisely, 12% of non-users are new clients (have made the contract in the last 4 months, thus being at the beginning of the binding period). Actually, this is the group with the highest average remaining binding period.

Taking a look at the sales channels, it is possible to conclude that the vast majority of these new clients come from push distribution channels – direct sales are the main channel accounting for 65% of these new clients (this channel only represents 18% of the average customer acquisition).

vi) Loyals

Clients with value-added services are proven to be less likely to churn (Gosselin, 2017) than the others, becoming more engaged with the company. Accordingly, “Loyals” refer to clients with a customer profile higher than 5P³⁵, accounting for 5% of voluntary churn.

71% of these clients are above 4 years old and most of them are outside of the binding period. In comparison with the total voluntary churn, this group has a higher percentage of clients who have just renewed the contract 4 months before churn (8%).

29% of this group only sends registered letter to cancel the contract, instead of calling or going to a store, which demonstrates that they are less susceptible to retention actions. However, these clients have a higher tendency to report problems in the customer service – 47% of them have complaints in the last 4 months. These clients are heavy-users, which might explain the number of complains, registering the highest level of both mobile data usage and TV viewing.

When it comes to the customer profile, 77% of “Loyals” have 6 services (6P) followed by 19% of 7P. The utilization of NOS Card is the service that appears the most in this group's

³⁵ Note that there are 5 basic services and 11 value-added services. Therefore, a customer profile above 5P includes, at least, one value-added service.

bundles, followed by Multiroom and Sport Premium Channels. These clients have also the highest ARPU.

vii) Unsatisfied - Technical Failures

This group, accounting for 4% of the total voluntary churn, includes clients who have reported technical failures through the Customer Service in the last 4 months before churn, aiming to identify clients that might have churned because of the service quality, which was pointed out in the Literature Review as one of the main components of customer satisfaction (Soomro et al, 2020).

Regarding the level of seniority and the binding period, this group presents a very particular behavior. Firstly, 31% of these clients are under 1 year old (comparing to 10% of the total voluntary churn). Secondly, there is a higher percentage of clients who have just made/renewed the contract in the last 4 months – 17% are new clients and 8% are renewals.

When it comes to technical characteristics, this group has a higher percentage of clients with DTH services (41%), in comparison with the total voluntary churn (28%), suggesting that this technology presents more problems than fiber-based ones. Regarding the equipment, the pattern is much similar to the one of voluntary churn, indicating that there is not an association between technical failures and the type of equipment.

viii) Unsatisfied - Administrative shortcomings

This segment, in turn, represents clients who are also unsatisfied, not because of the service quality, but because of problems regarding administrative processes (e.g. improper billing). Uner et al (2020) have already pointed out the importance of Customer Service and Billing to customer satisfaction, which is mirrored by this group – 5% of the total.

This group of unsatisfied customers also has a higher percentage of clients who have just made/renewed the contract, although the difference is not as big as in the case of the previous group. Regarding the technology, 63% of these clients have Fiber 1, in contrast to those dissatisfied with technical failures. In addition, clients dissatisfied with administrative processes are more concentrated in lower levels of ARPU.

ix) More unsatisfied

The third and last group of dissatisfied customers accounts for 6% of the total voluntary churn and includes clients who have reported complaints not only 4 months before churn,

but also the year before, regardless of the type of complaint, indicating a recurrence of such dissatisfaction. This group has a similar pattern to the two previous groups, regarding the level of seniority and the binding period. It has a higher concentration of the latest equipment, both router and TV box, that is justified by the higher percentage of new clients and renewals.

These 3 groups of unsatisfied clients have more complaints than the previous ones – groups “Technical Failures” and “More unsatisfied” have, on average, 6 complaints in the last 4 months before churn, and “Administrative Shortcomings” have 4.

x) No complaints >4 years old

The last two groups include clients that do not fulfill any of the previous requirements and, thus, have not reported any complaint in the last 16 months before churn. García-Mariñoso & Suárez (2019) found out that 42% of clients with problems do not report them, which makes it more difficult to identify them. In NOS’s case, these two groups together account for 54% of the total voluntary churn. The first one includes clients above 4 years old and is the most representative one (38%).

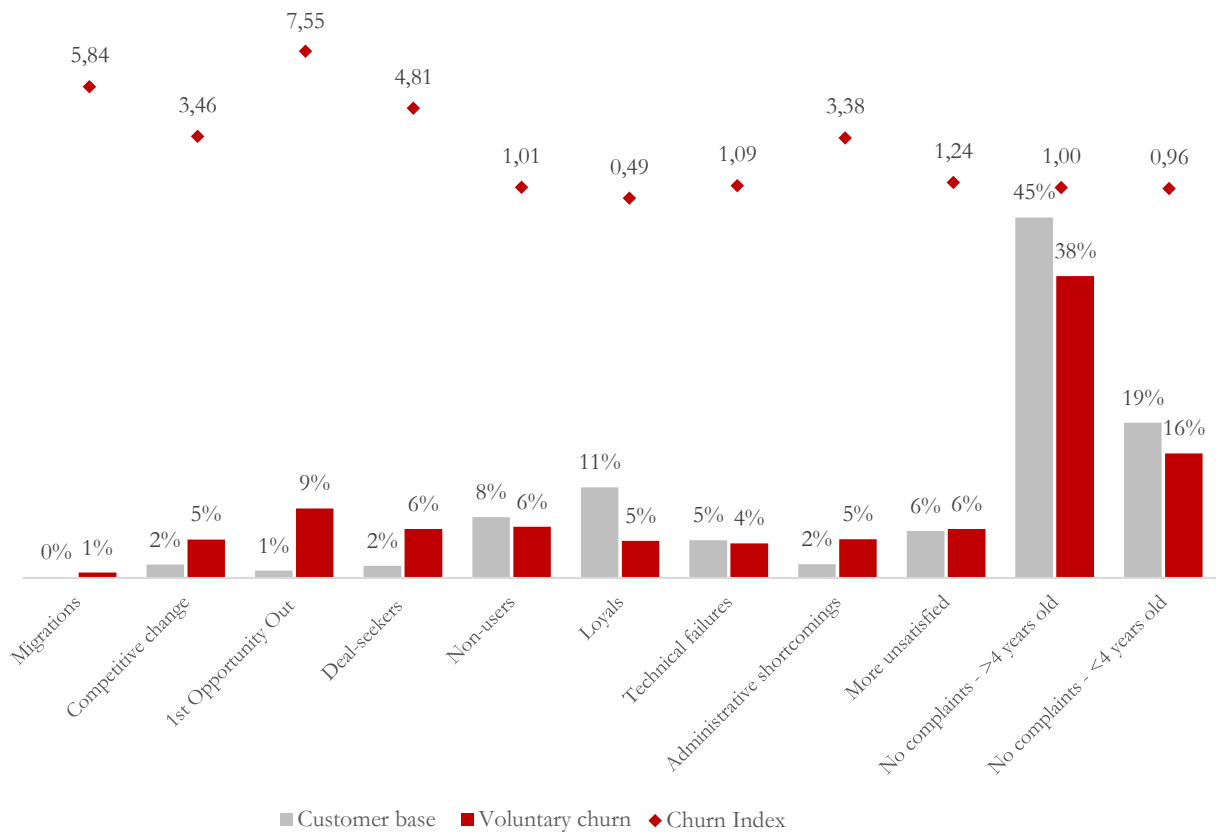
57% of these clients are above 7 years old and the vast majority is outside of the binding period, which makes it easier for them to cancel the contract. Besides, these are clients with few products and services, since the most representative bundle only includes TV, Fixed Voice and Fixed Internet (22%) followed by TV, Fixed Voice, Fixed Internet and Mobile Voice (21%) and only TV (14%). Therefore, this group has the lowest ARPU.

xi) No complaints <4 years old

This group is similar to the previous one except that, instead of above 4 years old, clients are younger than that – 16% of the total voluntary churn.

Regarding the number of products/services, this group has a higher concentration of clients with a customer profile of 3P (48%) and an ARPU between 30€ and 40€ (40%). The most representative bundles are the same of the previous group. This group has the lowest level of TV viewing (after “Non-users”), which might explain the lack of complaints.

Graph 29: Segments' distribution in the customer base and voluntary churn, as well as the respective churn index for each



Despite the large representation of the last two groups, the ones with higher churn indexes (Graph 29³⁶) are the “1st Opportunity Out” and “Deal-seekers” (“Migrations” has one of the highest churn indexes but must not be considered a group of voluntary churn, as it was explained previously).

3.2. Involuntary Churn

i) Migrations

Around 1% of involuntary churn is due to migrations of technology, which should not, once again, be considered customer churn. When the migration is not properly registered, the client might still be considered a DTH client, while being also a fiber one, receiving invoices for the two different services. If clients receive two different invoices and pay only one of them, they end up being involuntary churn of one of those services. Therefore, this group

³⁶ Segments are sorted by the order of iteration, from the first to the last one.

includes clients both from DTH and fiber-based services, depending on which invoice was not paid.

ii) New Clients

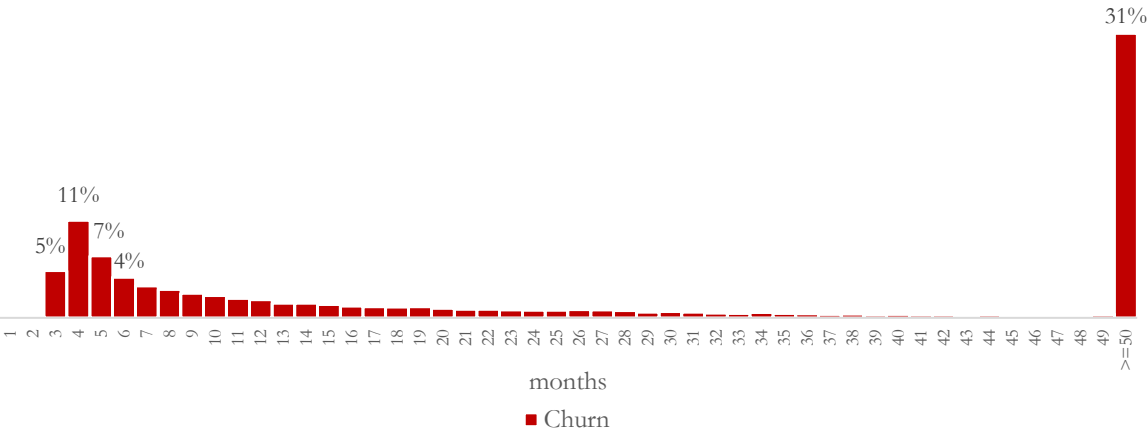
As it was explained during the characterization of involuntary churn (RQ1), one particularity is that it has a peak of clients leaving 4 months after the beginning of the contract (Graph XXX). These are called “New Clients” and might be a result of improper sales, representing 13% of the total involuntary churn. Besides, Adikari et al (2008) have already pointed out the issue of fraudulent usage, which might be the case of these “New Clients”, who make a contract to get access to the equipment and the services the company provides, without paying any invoice. Fraudulent usage is more common in DTH services, and this group has indeed a higher percentage of DTH clients than the entire churn (57% comparing to 36%).

“New Clients” have the highest level of mobile data usage but the lowest TV viewing of all groups of involuntary churn, except for migrations of technology.

To include only clients who have not contacted NOS, this group has a constraint that ensures that these clients have not passed through retention actions.

Concerning the entry channel, these clients have a higher representation of push distribution channels, comparing with the average customer acquisition, especially when it comes to Outbound – e.g., win-back actions – and Direct Sales.

Graph 30: Involuntary churn by level of seniority (months)



iii) Voluntary

From RQ2, it was possible to realize that some of the involuntary churners went to retention actions in the last 4 months before churn.

Accordingly, these are clients who demonstrate their intent to cease the contract, being submitted to retention actions and not accepting any of the offers. However, at the end, instead of formalizing it through the appropriate channels (at a store or by registered letter), they willingly stop paying invoices, until NOS ceases the contract. Therefore, this group consists of clients that could be considered voluntary churn since they notify NOS, in advance, about their willingness to leave.

Unexpectedly, half of these clients are at the end or out of the binding period (in comparison with 19% of the total involuntary churn), suggesting that they would not have to pay early termination fees to unilaterally cancel the contract. Besides, 51% is above 4 years old which is, once again, much higher than the pattern for the total involuntary churn.

iv) Renewals

This group accounts for 7% of the total involuntary churn and consists of clients who have just renewed the contract in the last 4 months before churn and are above 12 months old. These clients are bounded by the terms of the contract, which, in case of dissatisfaction, makes them more likely to end up involuntary than voluntary churn, avoiding early termination fees. From NOS's standpoint, the contract was successfully renewed, while they end up defaulting.

Regarding the level of seniority, this group presents a very similar pattern to the total involuntary churn, being 52% above 4 years old. In addition, and like it was expected, these clients are more concentrated in higher customer profiles (>5P), than the other churn, suggesting an increase in the number of value-added services derived from the renovation of the contract – and, consequently, an increase in the level of ARPU.

Finally, the most important aspect is the channel used to renew the contract. In contrast to customer acquisition, at the moment of the renewal, pull strategies have more representation. 28% of this group has renewed the contract after announcing their intention to cancel the contract. Following that, they were submitted to retention actions, ending up renewing the contract, while still meaning to leave NOS. Actually, 54% of these churners have passed through retention actions in the last 4 months, being successfully retained.

v) Chronic default

While in voluntary churn clients willingly cease the contract, involuntary churn might come from two different general motives: (1) clients want to leave the company but, being bounded by the contract and not wanting to pay early termination fees, stop paying invoices and (2) clients can no longer afford to pay. The previous groups are, for the most part, clients who are dissatisfied or want to end the contract, but do not formalize it by the appropriate channels (first motive). Groups v) and vii) might be considered the “true” involuntary churn. This “Chronic default” group includes those who are constantly having difficulties paying the invoices and might be already under payment arrangements.

Actually, involuntary churn are clients who default the last 4 months before churn, but 35% of them have already default in the previous 5 months³⁷ – chronic default. Following the order of iteration, this group accounts for 26% of the total involuntary churn.

These clients are above the average, regarding the level of seniority, being more concentrated in levels above 2 years old. The level of ARPU has a very similar pattern in this segment, comparing to the total involuntary churn, which indicates that clients who recurrently default do not have higher ARPU. Lastly, 48% of this group is under payment arrangements, which they failed to comply.

vi) Unsatisfied

Like it happened with voluntary churn, there is a group of clients who are unsatisfied with the products/services, thus making more than 1 complaint in the Customer Service 6 months before churn. These clients represent 6% of the total involuntary churn and 57% of them are under 1 year old, thus facing a longer binding period than the rest. Regarding the number of products/services, this group of clients is concentrated in higher customer profiles – 68% has more than 4 products/services, comparing to 56% of the total involuntary churn – as well as in higher levels of ARPU – this group has the second-most high ARPU.

Comparing this group’s pattern with the total involuntary churn, unsatisfied clients have a higher concentration of the latest equipment, both for router and TV box. This group has, on average, 5 complaints in the Customer Service in the last 6 months before churn, which is more than the previous ones. In addition, 37% of this group has both type of complaints

³⁷ This means that clients have registered, at least, one SD in the last 4 months and, at least, another one in the previous 5 months.

(about technical failures and administrative shortcomings), in contrast to 24% of the total involuntary churn.

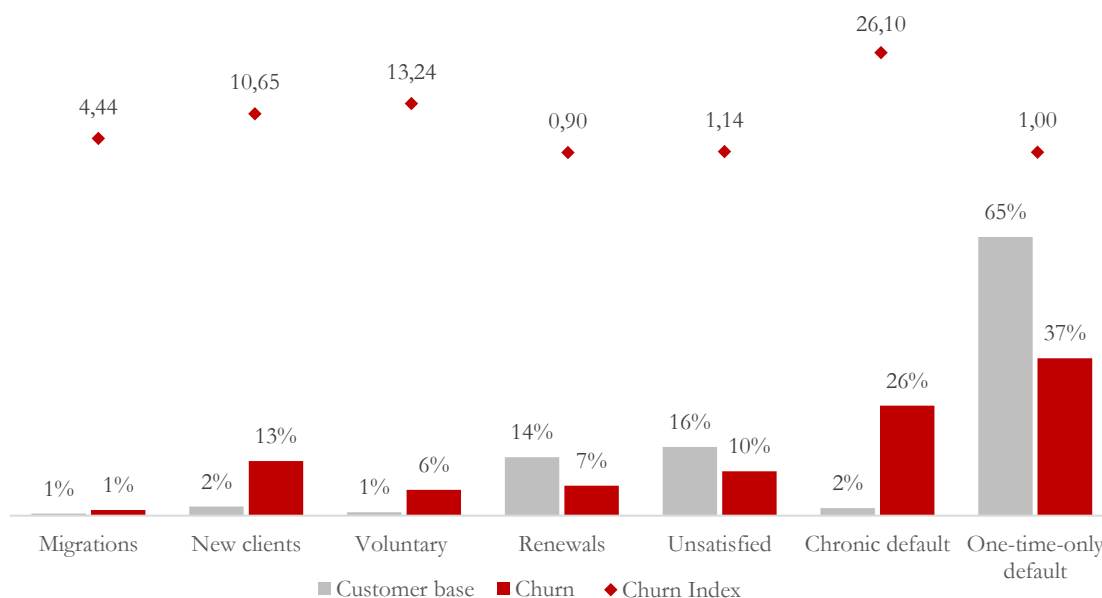
vii) One-time-only default

This group is the remainder, including those clients that do not meet any of the previous requirements – have not reported problems in the Customer Service, did not pass through retention actions and are not new clients nor renewals.

In the case of involuntary churn, these are clients who stop paying just for once, denominated “One-time-only default”, in contrast to “Chronic default”. In the customer base, these are clients that, in case of default, would enter to the group “One-time-only default” – although it does not necessarily mean that they have already defaulted – because they do not meet any of the abovementioned conditions.

Clients who have defaulted more than once are the ones with the highest churn index, followed by the groups “Voluntary” and “New Clients” (Graph 31).

Graph 31: Segments' distribution in the customer base and involuntary churn, as well as the respective churn index for each



4. Brief Results Overview

Based on the literature and NOS's standards, two types of churn were identified: involuntary churn, especially related to customers' credit issues, and voluntary churn, which includes customers that willingly leave the company. Findings further show that some variables (e.g., the level of TV viewing and the number of products/services the client has) have a mitigating effect on both voluntary and involuntary churn, while others (e.g. mobile data usage and number of complaints) seem to increase the phenomenon. On the contrary, the price and the equipment model do not have a clear association with customer churn. Besides, this study elaborates on the individual effect of some products/services, proving that clients who, for example, buy equipment in installments have less propensity to cancel the contract than those who do not.

Finally, concerning customer segmentation, this study found out that only 63% of involuntary churners stopped paying invoices because they could not afford to pay, while the others might have other motivations to churn. Regarding voluntary churn, 54% of those clients do not have complaints, which makes it more difficult to anticipate the moment of churn. The other groups point out specific churn determinants that should be considered when developing the company's retention actions.

V. CONCLUSIONS

Following the evolution of the buyer/seller relationship, companies' focal point has been switching from customer acquisition to customer retention, especially in industries with high front-end costs, where the former can be 5 to 10 times more expensive than the latter (Gummesson, 1999; as cited in Opresnik & Hollensen, 2019). This is the case of the Portuguese telecommunications industry, characterized by a saturated market with fierce competition, where customers are constantly switching to another provider. This movement was named by Berson et al (2000) as the Churn phenomenon and has been an increasing concern to many companies, hindering the customer base and its profitability. Customer churn occurs at the last stage of the CRLC – “Dissolution” phase (Dwyer et al, 1987) – and customer retention strategies aim to increase customer satisfaction and loyalty during the previous stages, in order to increase as much as possible the customer lifetime value.

This study was developed under the scope of an internship held at NOS *Comunicações* SA, a Portuguese telecommunications company, and its purpose was to (1) understand the types of customer churn, (2) identify the main variables associated with it and (3) segment these clients into groups, in order to develop customized retention actions to each segment. As such, this study contributes to better understand the main customer variables associated with this phenomenon and to characterize the groups of clients that abandon the company, in order to help managers to anticipate it and develop suitable retention actions for each group.

1. Final Remarks and Managerial Implications

This investigation followed a qualitative methodology, based on a case study research. The use of different sources of evidence – data triangulation – provided a more holistic approach about the churn phenomenon, through direct observation and collection of archival records.

Direct observation was especially useful to understand the company's dynamics and points of view about customer churn (RQ1). Following previous studies' lines of thought (Yang & Chiu, 2006), NOS considers two types of churn: voluntary churn happens when a client willingly cancels the contract, while involuntary churn derives from non-payment.

The immediate differences between those types of churn are about the level of seniority and the binding period. Voluntary churners have already ended the binding period, on average,

3.59 months before churn, which means they have not renewed the contract. On the contrary, involuntary churn has, on average, a remaining binding period of 11.59 months, which makes it more difficult for them to leave the company.

The analysis of archival records was essential to study the main variables related to customer churn (RQ2). Most of the variables under analysis, especially those about customer usage and actions, presented similar patterns for voluntary and involuntary churn, which suggests that clients who leave NOS, whether by ceasing the contract (voluntary churn) or by default (involuntary churn) tend to have the same behavior in the last months before churn.

Regarding the association between some variables and customer churn, this investigation corroborates findings from previous studies – the more products/services the clients have, the lower the churn index tends to be (Gosselin, 2017; Keaveney, 2001); those who have higher TV viewing have less propensity to churn (Uner et al, 2020); on the contrary, concerning mobile data, heavy-users seem to have higher churn indexes, as well as the more complaints, the higher the churn index (Ahn et al, 2006); and, lastly, administrative shortcomings seem to generate a higher level of dissatisfaction (higher churn index) than technical failures (Akmal, 2017). In addition, this study elaborates on more particular issues, such as, for example, the individual impact of different products/services on customer churn, which is different for voluntary and involuntary churn. Besides, the “Price” variable, related to the ARPU metric, also has different patterns for the two types of churn, as well as for different groups from those types. Voluntary churners who are out of the binding period, as well as new clients from involuntary churn, have higher churn indexes for higher levels of ARPU (Yuan et al, 2019; Soomro et al, 2020), while the others present the opposite association.

This analysis has also proved that clients tend to diminish their TV viewing over the months preceding churn. This suggests that companies could use this behavior to anticipate voluntary churn, following clients’ level of TV viewing.

Finally, clients’ segmentation (RQ3) allows NOS to infer some churn determinants and develop targeted mitigation actions accordingly. While previous researches have studied the impact of specific mitigation actions on the entire customer churn, this study sought to segment those clients so that NOS could be able to develop customized retention actions, according to each segment’s characteristics.

Concerning involuntary churn, this study found out that only 63% of these clients stopped paying invoices because they could not afford to pay, while the others might have other motivations to churn. Some of these clients form the group “Chronic default”, which accounts for 26% of the involuntary churn. These clients have already failed to pay more than once, and 48% of them are already under payment arrangements. However, a payment arrangement only postpones the problem, because they will have to pay the same amount they could not afford to pay previously. Therefore, while this procedure might be helpful in specific temporary financial difficulties – which is the case of the group “One-time-only default” –, a service downgrade could be more appropriate for clients with chronic default. It is important to analyze whether this sacrifice on immediate profitability would compensate the future loss derived from involuntary churn or not. This was previously explored in some studies (Wong, 2011; Ascarza et al, 2016), although there is not still a common ground on that matter. The segment “One-time-only default” (37%) is more difficult to predict since they do not demonstrate, in advance, their willingness to leave. On the contrary, 6% of involuntary churn communicates their intention to cancel the contract since they have already passed through retention actions, ending up as “Not Recovered”. NOS could develop a specific procedure to this segment – which is called “Voluntary” and has one of the highest churn indexes – different from the dunning process, since these clients stop paying because they want to cancel the contract, and not because they cannot afford to pay. Therefore, the dunning process, which consists of regular reminders to pay, might not make sense in this case. In addition, the churn index of the group “New clients” indicates that there should also be an increased concern about sales channels and strategies, as it is suggested by Gallo (2014), who mentioned the important role of good customer acquisition to diminish customer churn.

When it comes to voluntary churn, 54% of those clients do not report problems in the Customer Service, which makes it difficult to know their dissatisfaction and anticipate the moment of churn. However, the group “1st Opportunity Out” – that has the highest churn index – proves that the moment of the first renewal of the contract is crucial to customer churn. Therefore, NOS should rethink its retention strategy to those customers and understand what it takes for them to leave. Burez & Poel (2007) have proved that obtaining customer feedback through questionnaires reduces substantially the churn rate and this could be especially useful in avoiding this group of customers to leave. In addition, the rate plan optimization (Wong, 2011) that was pointed out as a mitigation action to those who cannot afford to pay, is also valid to the group “Non-users” of voluntary churn. These customers

might be leaving because of a misalignment between their needs and their rate plan and, consequently, this action could have a positive effect on them.

Lastly, developing the right approach to handling customer complaints might considerably mitigate both voluntary and involuntary customer churn derived from dissatisfaction. Borah et al (2020) have proved that compensation, politeness and courtesy are more effective in the case of process failure – similar to administrative shortcomings – than outcome failure – equivalent to technical failures. Greater consideration of these factors can create a more positive service experience, difficult for competitors to replicate.

2. Limitations and Future Research Directions

This study was based on two main sources of evidence – direct observation and archival records – which, in contrast to surveys, do not depend on someone's opinion and, consequently, are more reliable and less subjective (Yin, 2003). However, to understand customer churn and its determinants, this study could have benefited from a survey to clients in order to corroborate its conclusions.

Another limitation, regarding the dataset, is about the time frame that might have had an impact on some conclusions – 2020 was an atypical year, due to the covid-19 pandemic, that had several implications on the telecommunications industry, as it was explained in section 2.1.1. from Chapter 3. Besides this potential covid-19 bias, some variables are only applicable to fiber-based services (e.g. the level of TV viewing) or have a few missing values, albeit not relevant considering the huge amount of data.

Finally, when it comes to the customers' segmentation, the criteria was based on the business understanding and, consequently, some constraints could be applied in a different way – for example, part of the involuntary churn consists of clients who want to cancel the contract and, consequently, they could be analyzed through voluntary churn's criteria. To overcome this limitation, it was followed an iterative process of definition and continuous improvement and further confirmation with different people from the organization.

García-Mariñoso & Suárez (2019) have found out that 42% of unsatisfied customers do not report their problems and, consequently, companies must develop proactive actions to identify them. Accordingly, further analyses could include data about the internet connection quality and equipment reboot to identify customers that are having technical failures but do not make complaints in the Customer Service – it would provide better understanding about

groups x) and xi) of voluntary churn. Reaching these clients about their problems would improve the brand image, the customer satisfaction and, as a consequence, the customer loyalty.

In addition, there could be a more thorough analysis to the segments of churners identified in RQ3. For example, studying the relationship between involuntary churn and the economic cycle, the evolution of the disposable income or the unemployment rate, would allow a better understanding of the group “One-time-only default”. Another example of further research directions would be analyzing the role of bundled services, especially those value-added ones, as a mitigating factor (e.g. payments in installments) or a driver to churn (e.g. wi-fi extenders). Following the increasing constraints, imposed by regulators, to the binding period, companies might focus on developing a great bond with clients, through ways other than the contractual ones. Value-added services might play a key role on that matter and, thus, should be a subject of analysis.

Findings from this investigation may be applied to other telecommunications companies, and, if duly adjusted, even to other subscription-based industries, that rely deeply on customer retention.

REFERENCES

- Adikari, A., Samarasinghe, A., & Rabel, S. J. E. J. o. t. I. o. E., Sri Lanka. (2008). Churn Management in Sri Lankan Mobile Market. *41*(1).
- Ahn, J.-H., Han, S.-P., & Lee, Y.-S. J. T. p. (2006). Customer churn analysis: Churn determinants and mediation effects of partial defection in the Korean mobile telecommunications service industry. *30*(10-11), 552-568.
- Akmal, M. (2017). *Factor Causing Customer Churn: A Qualitative Explanation of Customer Churns In Pakistan Telecom Industry* MS Thesis], March].
- Amin, A., Al-Obeidat, F., Shah, B., Adnan, A., Loo, J., & Anwar, S. (2019). Customer churn prediction in telecommunication industry using data certainty. *Journal of Business Research*, *94*, 290-301.
- ANACOM. (2021). *Facts & Figures 2020*.
- Ascarza, E. (2018). Retention Futility: Targeting High-Risk Customers Might be Ineffective. *Journal of Marketing Research*.
<https://journals.sagepub.com/doi/full/10.1509/jmr.16.0163>
- Aspers, P., & Corte, U. (2019, 2019/06/01). What is Qualitative in Qualitative Research. *Qualitative Sociology*, *42*(2), 139-160. <https://doi.org/10.1007/s11133-019-9413-7>
- Benedek, G., óy, A. L., & Vastag, G. (2014). The Importance of Social Embeddedness: Churn Models at Mobile Providers. *Decision Sciences Institute*, *45*.
- Borah, S. B., Prakhya, S., & Sharma, A. J. J. o. t. A. o. M. S. (2020). Leveraging service recovery strategies to reduce customer churn in an emerging market. *48*(5), 848-868.
- Burez, J., & Van den Poel, D. (2007, 2007/02/01/). CRM at a pay-TV company: Using analytical models to reduce customer attrition by targeted marketing for subscription services. *Expert Systems with Applications*, *32*(2), 277-288.
<https://doi.org/https://doi.org/10.1016/j.eswa.2005.11.037>
- Burez, J., & Van den Poel, D. (2008, 2008/07/01/). Separating financial from commercial customer churn: A modeling step towards resolving the conflict between the sales and credit department. *Expert Systems with Applications*, *35*(1), 497-514.
<https://doi.org/https://doi.org/10.1016/j.eswa.2007.07.036>

- Burnett, T. (2014). The Impact of Service Bundling on Consumer Switching Behaviour: Evidence from UK Communication Markets. *The Centre for Market and Public Organisation*.
- Burnham, T. A., Frels, J. K., & Mahajan, V. (2003, 2003/04/01). Consumer Switching Costs: A Typology, Antecedents, and Consequences. *Journal of the Academy of Marketing Science*, 31(2), 109-126. <https://doi.org/10.1177/0092070302250897>
- Customer churn rate in the United States in 2018, by industry*. (2020). Statista Research Department. <https://www.statista.com/statistics/816735/customer-churn-rate-by-industry-us/>
- Dahiya, K., & Bhatia, S. (2015, 2-4 Sept. 2015). Customer churn analysis in telecom industry. 2015 4th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO) (Trends and Future Directions),
- Dalvi, P. K., Khandge, S. K., Deomore, A., Bankar, A., & Kanade, V. A. (2016, 18-19 March 2016). Analysis of customer churn prediction in telecom industry using decision trees and logistic regression. 2016 Symposium on Colossal Data Analysis and Networking (CDAN),
- Dass, R., & Jain, R. (2011). An Analysis on the factors causing telecom churn: First Findings. AMCIS,
- Devriendt, F., Berrevoets, J., & Verbeke, W. (2021, 2021/02/16/). Why you should stop predicting customer churn and start using uplift models. *Information Sciences*, 548, 497-515. <https://doi.org/https://doi.org/10.1016/j.ins.2019.12.075>
- Eshghi, A., Haughton, D., Teebagy, N., & Topi, H. (2006, Fall2006). DETERMINANTS OF CUSTOMER CHURN BEHAVIOR: THE CASE OF THE LOCAL TELEPHONE SERVICE [Article]. *Marketing Management Journal*, 16(2), 179-187. <http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bsu&AN=23394906&lang=pt-pt&site=ehost-live&scope=site>
- Fournier, S., & Avery, J. (2011, 03/01). Putting the 'Relationship' Back in CRM. *MIT Sloan Management Review*, 52, 63-72.
- Gallo, A. (2014). The Value of Keeping the Right Customers. *Harvard Business Review*.

- García-Mariñoso, B., & Suárez, D. (2019, 2019/06/01/). Switching mobile operators: Evidence about consumers' behavior from a longitudinal survey. *Telecommunications Policy*, 43(5), 426-433. <https://doi.org/https://doi.org/10.1016/j.telpol.2018.12.001>
- Garín-Muñoz, T., Pérez-Amaral, T., Gijón, C., & López, R. (2016, 2016/08/01/). Consumer complaint behaviour in telecommunications: The case of mobile phone users in Spain. *Telecommunications Policy*, 40(8), 804-820. <https://doi.org/https://doi.org/10.1016/j.telpol.2015.05.002>
- Gosselin, M.-A. (2017). *Understanding the influence basic service and value-added service usage has on customer churn in Pay-TV subscription services* [Concordia University].
- Gunnvald, B. S., & Nina, K. P. (2013). The effect of brand on churn in the telecommunications sector. *European Journal of Marketing*, 47(8), 1177-1189. <https://doi.org/10.1108/03090561311324273>
- Hauwa Aliyu Yamta, Y. G., Yagana B. K. Imam. (2018). Relationship Marketing and the effect on customer retention. *SAJRED: Journal of Resources & Economic Development*, 1.
- Hind Benouakrim, F. E. K. (2013). Relationship Marketing: Literature Review *International Journal of Science and Research (IJSR)* 2(10).
- Hu, X., Yang, Y., Chen, L., & Zhu, S. (2020, 10-13 April 2020). Research on a Customer Churn Combination Prediction Model Based on Decision Tree and Neural Network. 2020 IEEE 5th International Conference on Cloud Computing and Big Data Analytics (ICCCBDA),
- Hung, S.-Y., Yen, D. C., & Wang, H.-Y. (2006, 2006/10/01/). Applying data mining to telecom churn management. *Expert Systems with Applications*, 31(3), 515-524. <https://doi.org/https://doi.org/10.1016/j.eswa.2005.09.080>
- Kanagal, N. B. (2009, 01/01). Role of relationship marketing in competitive marketing strategy. *Journal of Management and Marketing Research*, 2, 1-17.
- Keaveney, S. M. (1995, 1995/04/01). Customer Switching Behavior in Service Industries: An Exploratory Study. *Journal of Marketing*, 59(2), 71-82. <https://doi.org/10.1177/002224299505900206>

- Keaveney, S. M., & Parthasarathy, M. (2001, 2001/10/01). Customer Switching Behavior in Online Services: An Exploratory Study of the Role of Selected Attitudinal, Behavioral, and Demographic Factors. *Journal of the Academy of Marketing Science*, 29(4), 374-390. <https://doi.org/10.1177/03079450094225>
- Kim, H.-S., & Yoon, C.-H. (2004, 2004/10/01/). Determinants of subscriber churn and customer loyalty in the Korean mobile telephony market. *Telecommunications Policy*, 28(9), 751-765. <https://doi.org/https://doi.org/10.1016/j.telpol.2004.05.013>
- Kim, K., Jun, C.-H., & Lee, J. (2014, 2014/11/01/). Improved churn prediction in telecommunication industry by analyzing a large network. *Expert Systems with Applications*, 41(15), 6575-6584. <https://doi.org/https://doi.org/10.1016/j.eswa.2014.05.014>
- Lancaster, H. (2020). *Europe - Mobile Network Operators and MVNOs*.
- Lancaster, H. (2021). *Portugal - Telecoms, Mobile and Broadband - Statistics and Analyses*.
- Lin, T.-C., Wu, S., Hsu, J. S.-C., & Chou, Y.-C. (2012, 2012/12/01/). The integration of value-based adoption and expectation–confirmation models: An example of IPTV continuance intention. *Decision Support Systems*, 54(1), 63-75. <https://doi.org/https://doi.org/10.1016/j.dss.2012.04.004>
- Marciano, R., Lemieux, V., Hedges, M., Esteva, M., Underwood, W., Kurtz, M., & Conrad, M. (2018). Archival Records and Training in the Age of Big Data. In J. Percell, L. C. Sarin, P. T. Jaeger, & J. C. Bertot (Eds.), *Re-envisioning the MLS: Perspectives on the Future of Library and Information Science Education* (Vol. 44B, pp. 179-199). Emerald Publishing Limited. <https://doi.org/10.1108/S0065-28302018000044B010>
- Morgan, S. J., Pullon, S. R., Macdonald, L. M., McKinlay, E. M., & Gray, B. V. (2017). Case study observational research: A framework for conducting case study research where observation data are the focus. *Qualitative health research*, 27(7), 1060-1068.
- Mwaura, E. T. (2019). *Effects of Customer Experience Management on customer churn in the Telco industry in Kenya* [Strathmore University].
- Narayandas, D. (1998, 1998/11/01). Measuring and Managing the Benefits of Customer Retention: An Empirical Investigation. *Journal of Service Research*, 1(2), 108-128. <https://doi.org/10.1177/109467059800100202>

- NOS, S. (2021a). Annual Report and Consolidated Accounts 2020.
- NOS, S. (2021b). *Results Presentation 4Q20*.
- Oghojafor, B., Mesike, G., Bakarea, R., Omoera, C., & Adeleke, I. J. I. J. o. B. A. (2012). Discriminant analysis of factors affecting telecoms customer churn. *3*(2), 59.
- Reichheld, F. (2001). Prescription for cutting costs. *Harvard Business School Publishing*.
- Reichheld, F. F. (1993). Loyalty-Based Management. *Magazine (March–April 1993)*.
<https://hbr.org/1993/03/loyalty-based-management>
- Sai, B. K., & Sasikala, T. (2019). Predictive Analysis and Modeling of Customer Churn in Telecom using Machine Learning Technique. 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI),
- Santouridis, I., Tsachtani, E. J. P. E., & Finance. (2015). Investigating the impact of CRM resources on CRM processes: a customer life-cycle based approach in the case of a Greek bank. *19*, 304-313.
- Soomro, Y., & Al-Sehli, A. N. (2020). Determinants of Customer Churn: An Empirical Study Of Cellular Subscribers From Saudi Arabia.
- Surana, K., & Jain, P. (2017). *Reducing churn in telecom through advanced analytics*. Retrieved 04/10/2020 from <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/reducing-churn-in-telecom-through-advanced-analytics#>
- Taylor-Powell, E., & Steele, S. (1996). Collecting evaluation data: Direct observation. *Program Development and Evaluation. Wisconsin: University of Wisconsin-Extension*, 1-7.
- Thiel, G. R., & Hartley, N. T. J. S. A. M. J. (1997). Cooperative education: A natural synergy between business and academia. *62*(3), 19.
- Uner, M. M., Guven, F., & Cavusgil, S. T. (2020, 2020/05/01/). Churn and loyalty behavior of Turkish digital natives: Empirical insights and managerial implications. *Telecommunications Policy*, *44*(4), 101901.
<https://doi.org/https://doi.org/10.1016/j.telpol.2019.101901>
- Wang, Y.-F., Chiang, D.-A., Hsu, M.-H., Lin, C.-J., & Lin, I. L. (2009, 2009/05/01/). A recommender system to avoid customer churn: A case study. *Expert Systems with*

- Wong, K. K.-K. (2011, 2011/06/01). Getting what you paid for: Fighting wireless customer churn with rate plan optimization. *Journal of Database Marketing & Customer Strategy Management*, 18(2), 73-82. <https://doi.org/10.1057/dbm.2011.8>
- Yang, L.-S., & Chiu, C. (2006). Knowledge discovery on customer churn prediction. Proceedings of the 10th WSEAS International Conference on Applied Mathematics, Dallas, Texas, USA, November 1-3, 2006, pp523,
- Yin, R. K. (2003). *Case study research; design and methods*. (3rd ed.). Sage Publications
- Zhang, X., Zhu, J., Xu, S., & Wan, Y. (2012, 2012/04/01/). Predicting customer churn through interpersonal influence. *Knowledge-Based Systems*, 28, 97-104. <https://doi.org/https://doi.org/10.1016/j.knosys.2011.12.005>

APPENDIX 1 – NOS Group

Company	Ownership
NOS Comunicações, S.A.	100%
NOS Lusomundo Audiovisuais, S.A.	100%
NOS Lusomundo Cinemas, S.A.	100%
NOS Technology, S.A.	100%
NOS Sistemas, S.A.	100%
NOS Inovação, S.A.	100%
NOS Corporate Center, S.A.	100%
NOS Audio Sales & Distribution, S.A.	100%
NOS Wholesale, S.A.	100%
NOS Açores Comunicações, S.A.	84%
NOS Madeira Comunicações, S.A.	79%
DREAMIA, S.A.	50%
ZAP	30%
SPORT TV, S.A.	25%

APPENDIX 2 – Examples of each type of complaints

The 15 most common complaints both in voluntary and involuntary churn.

Technical Failures	Administrative Shortcomings
There is an error message on the television.	I don't agree with the invoice value.
I don't have internet access.	I keep receiving invoices but I don't have any service.
I can't watch TV.	I don't agree/understand the invoice value.
I want to complain about a technical intervention.	I don't agree with the conditions.
The internet connection is down.	I don't agree with the binding period.
I can't make nor receive calls.	I don't agree/understand the usage value.
The TV box keeps freezing.	I'm being double-charged.
I can't make calls.	I don't agree with the breach of contract.
The television keeps cutting out.	I want to complain about the performance.
The remote control doesn't work.	I don't agree with the equipment return.
The television has poor image quality.	I don't agree with the price charged for the equipment.
I've selected the option but can't watch the TV programs.	I don't agree with the cancellation fees.
The TV box keeps rebooting.	I have already paid, but I still don't have service.
I can't access the internet by wireless.	I haven't received any invoice.
I can't access.	I don't agree with the price update.