




Determinants of churn in telecommunication services: a systematic literature review

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Abstract

The telecommunications industry is particularly competitive and characterized by very high churn rates. The literature on the topic is vast, but studies on the determinants of churn behavior are dispersed, failing to provide a comprehensive view of the state of the art. Based on this research gap, this article aims to contribute to developing the literature on customer churn in the telecommunications sector by summarizing the current state of research, and identifying the main determinants of churn and switching intentions. It provides a systematic literature review (SLR) of 37 articles on the topic published between 1999 and 2022. The results reveal the existence of two research streams. The first, in which the studies are based on surveys examining the alleged intentions of subscribers to change operators, with criteria such as satisfaction and attitudes as predictors, and the second, dealing with subscribers' actual switching behavior and relating this to behaviors and characteristics extracted from internal customer management systems. All independent variables used to explain switching intention or real churn were mapped. It was found that age, gender, satisfaction, switching costs and barriers, and service quality are the most important determinants highlighted by the literature. Our study also outlines some insightful practical implications, which could be extended to other service sectors. The paper ends with a research agenda for future studies according to the gaps detected by the study's results. Among its limitations, this research excludes papers related to predictive models and studies not in English.

Keywords Systematic literature review · Customer switching behavior · Customer churn · Telco industry

Extended author information available on the last page of the article

1 Introduction

The telecommunications service industry has long been known for the intensity of competition and rivalry. While companies fiercely compete for customers, market share, and long-term survival (Kyei and Bayoh 2017), customers tend to switch operators repeatedly (Kumar et al. 2018) due to the lower financial costs associated with switching service providers. Considering that attracting new customers is both difficult and expensive, it is suggested that retaining the most valuable existing customers, and hence avoiding churn, should be given a higher priority than trying to attract new customers (Ahn et al. 2006; Hadden, Tiwari, Roy and Ruta 2007).

Considering the relevance of the topic, extant literature has explored the reasons behind customer churn in the telecom industry. Still, and as demonstrated in this article, the topic needs further study. Stressing some of the gaps in the literature, Ribeiro et al. (2022) explained recently that, although there are numerous studies on customer churn in the telecom market, the vast majority use predictive models with algorithmic means to identify customers who are most likely to switch operators. Indeed, much recent research (e.g. Amin, Al-Obeidat et al. 2019; Amin, Shah et al. 2019; Lu, Lin, Lu and Zhang 2014; Makhtar et al. 2017; Mozer, Wolniewicz, Grimes, Johnson, and Kaushansky 2000; Ullah et al. 2019) does not aim to identify the causes of churn, but rather to calculate the probability of operator switching for each customer. In addition, the literature on the determinants of churn behavior is particularly fragmented, with a need to map the state of the art and the research gaps in this topic clearly, to effectively define the most urgent avenues for future research. In order to fill this research gap, this article provides a comprehensive overview of customer churn in the telecommunications service industry, by conducting a systematic literature review (SLR). The main aim is to contribute to developing the literature on customer churn in the telecommunications sector by summarizing the current state of research, identifying the main determinants of churn and switching intentions, and pointing out strategies to reduce churn. In addition, as the telecommunications sector is one of the largest sectors worldwide, with extreme rivalry, we believe that the findings of this study can be applied to similar sectors with high customer churn rates. The method adopted is explained in detail in the next section.

2 Method

This article adopted the basic guidelines for SLRs established by Tranfield, Denyer and Smart (2003) in three steps: (1) planning the review, with particular emphasis on narrowing the scope of the study; (2) conducting the review, specifically establishing the review protocol and identifying key search terms and data analysis; and (3) reporting and disseminating the results using a cross-sectional approach.

The main theme of this SLR is customer churn, so the following main research question was defined:

- What are the determinants of churn in bundled telecommunications services?

Table 1 Search Strategy

Search Strategy:
("customer* churn*") OR ("consumer* churn*") OR ("bundling" * "churn") OR ("customer* turnover*") OR ("consumer* turnover*") OR ("customer* attrition*") OR ("consumer* attrition*") OR ("customer* rotation*") OR ("consumer* rotation*") OR ("customer* defection*") OR ("consumer* defection*") OR ("customer* switching*") OR ("consumer* switching*") OR ("switching tel*") OR ("customer* turnover*") OR ("consumer* turnover*") OR ("stayers * switchers") OR ("churn* management") OR ("churn* determinants") OR ("churn* factors") OR ("churn* analysis") OR ("defection* management")
AND
("tele*") OR ("telecom*")
NOT
("pred*") AND ("data mining*")

2.1 Article collection and selection

The relevant studies on customer churn in the telecommunications industry were identified in two steps. An initial search for articles was conducted on Web of Science (WoS) and Scopus databases using “customer churn” as the main keyword. The resulting articles were analyzed with NVIVO qualitative analysis software (QSR 2018), to identify other keywords used in the literature as synonyms of customer churn. This strategy identified other phrases (e.g., customer switching, customer turnover), which were combined in the final search query to ensure that various aspects and terminologies were fully covered. Table 1 shows the defined search strategy. The search was based on the articles’ title, abstract and keywords, and covered all articles published by the end of 2022.

The Boolean operators “OR” and “AND” were used in conjunction with the various keywords to narrow the search to “customer churn” and equivalent terminology in the telecommunications industry and also to exclude predictive studies or “data mining” techniques which were beyond the scope of this study. In order to focus on the most relevant contributions in the literature, the results comprised journal articles and reviews, regardless of the year of publication. Besides being written in English, the requirements for inclusion in this review were:

- The subject of the study was customer churn;
- The industry under study was telecommunications;
- The dependent variable of empirical studies should be churn or other variables representing churn behavior (e.g., switching intentions).

As articles were searched on two platforms (WoS and Scopus), The Bibliometrix software package from R Core Team (Team 2021) was used to merge findings and exclude duplicates, resulting in 180 articles that were considered for the screening stage (Fig. 1).

Of these, all abstracts and keywords were read and analyzed in detail, excluding 124 articles that did not meet all the inclusion criteria. The remaining 56 articles were

Fig. 1 Research flowchart. Adapted from Haddaway and McGuinness (2021)

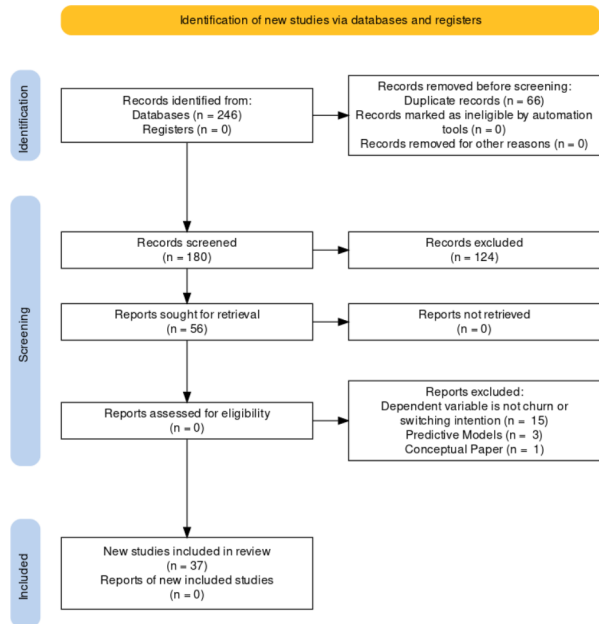


Table 2 Inclusion/exclusion criteria

Inclusion	Exclusion
-Articles in which the focus of study is customer churn	-Articles in which the focus of study is not customer churn
-The industry under study is telecommunications	-The industry under study is not telecommunications
-The dependent variable is the churn or the switching intention	-The dependent variable is not customer churn or switching intention
	-Articles based on predictive models
	-No access to the article
	-Not in English

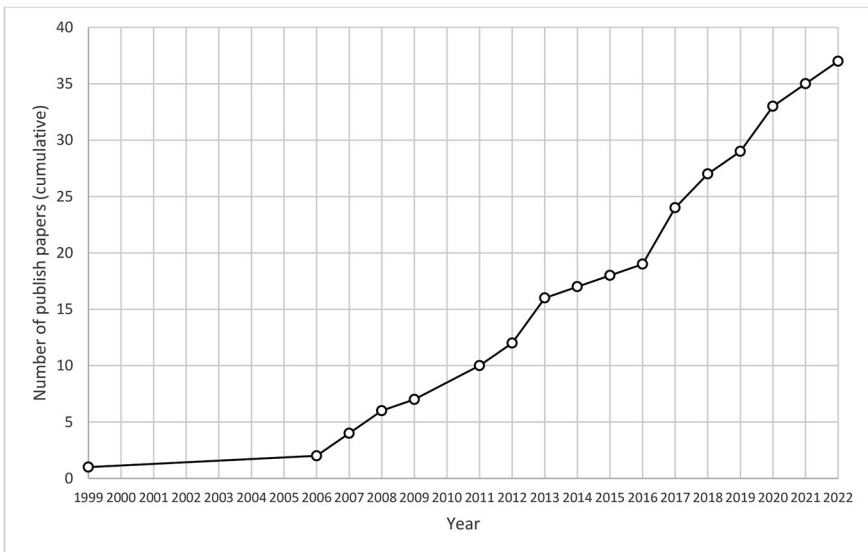
read in full, and the database was further narrowed down using the exclusion criteria presented in Table 2 to select only articles relevant to the research questions.

2.2 Data analysis procedures

After selecting the final articles, a database was created with NVIVO software (QSR 2018), where each article was coded into several categories/subcategories (e.g., year, publication source, country of origin, research methods). In addition, the articles were subjected to thematic content analysis to identify the independent explanatory variables for churn or switching intention and to summarize and clarify the relationships between the different factors in the literature.

Table 3 Main information about data

Description	
Articles	36
Review	1
Period	1999:2022
Annual Growth Rate	4.73%
Average citations per article	25.68
Total number of Authors	99
Authors of single authored articles	4
Authors of multi authored articles	95
Average number of authors per article	2.68
Collaboration Index	2.88

**Fig. 2** Publishing trend of articles in database under study

2.3 Data characteristics

Descriptive analysis was performed to summarize and explore the data. Table 3 shows the main statistics for the database under study. Articles analyzed in this study were published between 1999 and 2022, with an annual growth rate of 4.73%. The 37 articles in the database have an average of 25.68 citations. It is also observed that the articles were written by 99 authors, with an average of 2.68 authors per article.

As shown in Fig. 2, the number of articles has grown steadily since 2006, particularly in recent years, with more than 49% of publications published after 2016.

The 37 articles considered in this study have been published in 29 different journals. Still, *Telecommunications Policy* published seven articles, representing about 19% of all articles on the topic. The *Journal of Business Research* and the *Journal of Retailing and Consumer Services* are the second most important outlets used, with

Table 4 Articles Category/
Methodology aggregation

Category	Methodology	Frequency	%
Empirical/ Quantitative research studies	Structured questionnaire, interviews, factor analysis, SEM, Regression analysis, factor analysis, mediation and moderation analysis, others	32	84%
Empirical/ Quantitative case studies	Multi-Dimensional Scaling & Cluster Analysis	1	3%
Qualitative	Focus Group / Structured and semi-structured interviews	4	11%
Reviews	Literature Reviews	1	3%
Total		38	100%

Table 5 Articles by telecommunication services

Service Category	Frequency	%
Mobile	27	73%
Bundle services (also had single services)	3	8%
Internet fixed line broadband	2	5%
Internet fixed line broadband, Mobile, Land-line telephony (isolated services)	1	3%
Mobile Service + Internet fixed line broadband	1	3%
Fixed telephone	1	3%
Fixed telephone + Mobile service	1	3%
General telecommunications (does not specify the service)	1	3%
Total	37	100%

two articles published each one. The other journals published one article each. The other journals published one article each.

Regarding authors' affiliation, the University of Zaragoza, in Spain, with six articles published, stands out as the organization with the greatest number of published articles, and 21 institutions have more than one article on the topic.

Overall, the geographical dispersion shows that research and practice related to telecommunication churn have attracted attention around the world, but three countries – Spain ($n=13$), USA ($n=12$), and Germany ($n=8$) – originate 40% of the studies considered for this article.

In terms of methodology, quantitative studies dominate, accounting for 86% of the articles considered. Surveys (41%) and secondary data (27%) are the most popular data collection techniques. Amongst quantitative studies, logistic regression (39%) and structural equation modeling (24%) are the most commonly used data analysis techniques. Table 4 presents an overview of the methodology adopted.

Note: The total number is thirty-eight because one mixed-method study was included in both quantitative studies and qualitative studies.

Finally, it is important to note that all the selected studies belong to the field of telecommunications, in accordance with the defined research scope. However, the

articles study different types of telecommunication services, with the vast majority focusing on mobile telecommunication services (73%), as shown in Table 5.

2.4 Comparison of studies on churn vs. switching intentions

Through the literature review, it was possible to identify numerous constructs and independent variables that are essential in explaining customer churn. It is important to note, however, that several contributions adopt alternative variables and terminology in their studies, particularly switching intentions. In fact, among the 37 articles considered for this analysis, 15 consider churn as the dependent variable under study, and 18 opted for switching intention. Apparently, logistic regression is more popular amongst studies on customer churn, while structural equation modeling (SEM) stands out in studies explaining switching behavior (Table 6).

The articles were reviewed following an interpretative synthesis, as proposed by Jones et al. (2011). Several themes emerged, which are related to the main topics identified, churn, and switching intention. The same themes were subjected to analysis and validation by a panel of six telecommunications experts. In Fig. 3, we can observe the integrative framework with the seven themes: (1) Socio-demographics, (2) Service quality, Satisfaction and Service value, (3) Switching costs and barriers, (4) Tariff characteristics, (5) Customer-related variables, (6) Service usage, (7) and Market environment.

Table 7 shows the themes and the frequency with which their determinants were found in the literature review. The themes with the highest number of identified references were those related to satisfaction, service quality and service value, and customer-related variables.

Two main conclusions can be highlighted. First, the 37 articles consider a vast number of determinants of customer churn in the telecommunications service industry, providing a rich set of contributions to the field. Still, although several themes are recurrently considered by extant research (e.g., socio-demographics, service quality, satisfaction and value, switching costs and barriers, tariff characteristics), the articles use diversified variables in their models, with most of them addressed in only one article (e.g., perceived risks, transaction costs, consumer innovativeness). Consequently, the literature appears to be particularly fragmented. The findings associated with each theme are analyzed in detail in the next sections.

3 Antecedents of switching intention/churn in telcos

3.1 Socio-demographic variables

The theme labeled “Socio-Demographics” is composed of determinants with the highest number of identified occurrences (42), considering several socio-demographic variables as influencing the intention to switch and churn behavior.

Age provided divergent results, as some studies confirmed its influence on churn (Becker et al. 2015; Becker, Spann and Barrot 2020; Jin 2022; Garcia-Mariñoso and Suárez 2019; Gerpott and Meinert 2018; Lee 2017) while others rejected that hypoth-

Table 6 Statistical Analysis vs. Dependent variable under study

Statistical Analysis Technique	Dependent variable (Churn)	%	Dependent variable (Switching Intention)	%
Logistic Regression	7	47%	2	11%
SEM		0%	5	28%
PLS-SEM		0%	2	11%
Conditional Logit Model		0%	1	6%
Logit regression	1	7%		0%
Utility-Based Model	1	7%		0%
Dynamic linear probability panel	1	7%		0%
Correlation & Regression Analysis		0%	1	6%
Multi-Dimensional Scaling & Cluster Analysis		0%	1	6%
Regression & Probit Models		0%	1	6%
Chi-Square Test & Cross Table Analysis		0%	1	6%
SEM (Multi-group)		0%	1	6%
Multinomial Logit Regression	1	7%		
Proportional Hazard Regression	1	7%		
Tetrad Methodology & SEM		0%	1	6%
Logistic Regression & Multinomial Regression	1	7%		0%
Binomial Probit regression		0%	1	6%
Logistic Regression & Ordered Logit Models		0%	1	6%
Chi-Square Test	1	7%		0%
Logistic Regression Model & Two-Level Hierarchical Linear Model (HLM)	1	7%		
Total	15	100%	18	100%

esis (Keramati and Ardabili 2011; Lunn and Lyons 2018; Madden et al. 1999; Seo et al. 2008; Su et al. 2012; Svendsen and Prebensen 2013; Wong 2011).

Similar findings were identified regarding gender, as some studies found no statistical differences between genders in switching intention or churn (Becker et al. 2015; Garcia-Mariñoso and Suárez 2019; Jin 2022; Lee 2017; Su et al. 2012; Svendsen and Prebensen 2013) but other studies confirmed such differences (Ahn et al. 2006; Becker, Spann and Barrot 2020; Gerpott and Meinert 2018; Madden et al. 1999; Maicas et al. 2009; Seo et al. 2008).

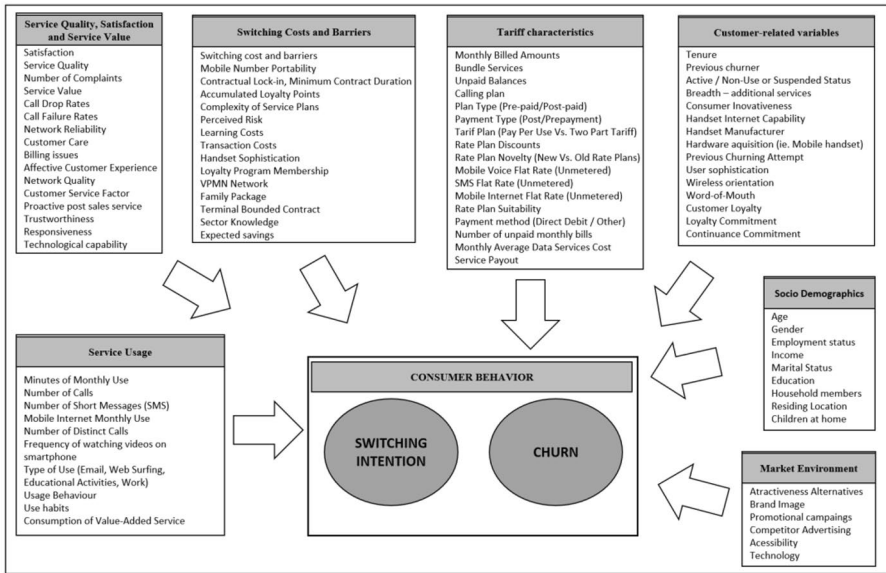


Fig. 3 Integrative Framework on Switching intention and Churn determinants

For the remaining socio-demographic variables found in the literature, the results are also divergent. Results were observed in which subscribers with lower incomes are more likely to switch operators (Madden et al. 1999), but results were also found where this same variable did not have a significant effect on switching intentions (Lunn and Lyons 2018).

Regarding employment status, the results tell us that this variable does not have a significant effect on churn (Garcia-Mariñoso and Suárez 2019), however, those who reported being retired were less likely to change (Lunn and Lyons 2018).

Regarding marital status, the results showed that this variable does not have a significant effect on switching intention (Lee 2017; Lunn and Lyons 2018). The same was observed for the education variable (Garcia-Mariñoso and Suárez 2019).

Regarding the number of household members, it was observed that households with multiple members are more likely to change operators (Madden et al. 1999; Lee 2017). The existence of children in the household also showed divergent results, with authors identifying this variable as having a significant impact on churn (Lunn and Lyons 2018), and others not observing this significant impact (Garcia-Mariñoso and Suárez 2019). Place of residence was also identified as having a significant effect on churn (Jin 2022; Wong 2011).

3.2 Service quality, satisfaction and service value

The theme of “Service Quality, Satisfaction and Service Value” has the second highest number of occurrences (33), but it is the one with the highest number of identified independent variables.

Table 7 Themes regarding Switching intention and Churn determinants

Socio Demographics	Frequency	Customer-related variables	Frequency
Age	13	Tenure	7
Gender	12	Previous churner	3
Employment status	4	Active / Non-Use or Suspended Status	2
Income	3	Breadth – additional services	1
Marital Status	3	Consumer Innovativeness	1
Education	2	Handset Internet Capability	1
Household members	2	Handset Manufacturer	1
Residing Location	3	Hardware acquisition (i.e. Mobile handset)	1
Children at home	2	Previous Churning Attempt	1
Total	44	User sophistication	1
Service Quality, Satisfaction and Service Value	Frequency	Wireless orientation	1
Satisfaction	10	Word-of-Mouth	1
Service Quality	4	Customer Loyalty	1
Number of Complaints	3	Loyalty Commitment	1
Service Value	3	Continuance Commitment	1
Call Drop Rates	2	Total	24
Call Failure Rates	2	Service Usage	Frequency
Network Reliability	2	Minutes of Monthly Use	2
Customer Care	2	Number of Calls	2
Billing issues	2	Number of Short Messages (SMS)	2
Affective Customer Experience	1	Mobile Internet Monthly Use	2
Network Quality	1	Number of Distinct Calls	2
Customer Service Factor	1	Frequency of watching videos on smartphone	1
Proactive post sales service	1	Type of Use (Email, Web Surfing, Educational Activities, Work)	1
Trustworthiness	1	Usage Behavior	1
Responsiveness	1	Use habits	1
Technological capability	1	Consumption of Value-Added Service	1
Total	37	Total	15
Switching Costs and Barriers	Frequency	Market Environment	Frequency
Switching cost and barriers	11	Attractiveness Alternatives	3
Mobile Number Portability	4	Brand Image	2
Contractual Lock-in, Minimum Contract Duration	4	Promotional campaigns	1
Accumulated Loyalty Points	2	Competitor Advertising	1
Complexity of Service Plans	2	Accessibility	1
Perceived Risk	1	Technology	1
Learning Costs	1	Total	9
Transaction Costs	1		
Handset Sophistication	1		

Table 7 (continued)

Socio Demographics	Frequency	Customer-related variables	Frequency
Loyalty Program Membership	1		
VPMN Network	1		
Family Package	1		
Terminal Bounded Contract	1		
Sector Knowledge	1		
Expected savings	1		
Total	33		
Tariff characteristics	Frequency		
Monthly Billed Amounts	5		
Bundle Services	6		
Unpaid Balances	2		
Rate Plan Suitability	2		
Plan Type (Pre-paid/Post-paid)	1		
Payment Type (Post/Prepayment)	1		
Tarif Plan (Pay Per Use Vs. Two Part Tariff)	1		
Rate Plan Discounts	1		
Rate Plan Novelty (New Vs. Old Rate Plans)	1		
Mobile Voice Flat Rate (Unmetered)	1		
SMS Flat Rate (Unmetered)	1		
Mobile Internet Flat Rate (Unmetered)	1		
Calling plan	1		
Payment method (Direct Debit / Other)	1		
Number of unpaid monthly bills	1		
Monthly Average Data Services Cost	1		
Service Payout	1		
Total	28		
TOTAL=189			

Source: Own elaboration

The service quality construct is traditionally conceptualized based on the disconfirmation paradigm. Gronroos (1984) defined the perceived quality of service as the result of an evaluation process, where customers compare their expectations with the service they received. Parasuraman, Zeithaml and Berry (1988) also support this point of view, defining the concept of service quality as a form of attitude, related but not equivalent to satisfaction, which results from a comparison of expectations with perceptions of performance. If the perceived reality is better than the expected service, it can be said that the service has a high quality of service. If the perceived service is equal to the expected service, the service can be considered satisfactory. On the contrary, if the perceived service is lower than expected, it can be said that the service has low quality. The higher the quality of bundled services in the telecommunications sector, the greater the level of satisfaction with the provider, enabling the development of trust (Carrizo-Moreira et al. 2017).

Most studies using the service quality construct observed that its effect was indirect, through customer satisfaction. Only one study (Mbarek and Baeshen 2019) con-

Table 8 Studies with service quality as an independent variable to explain switching intention or churn

Author	Dependent Variable	Telco Type	Data collection techniques	Statistical analysis technique	Sample	Direct Effect	Indirect Effect
(Mbarek and Baeshem 2019)	Switching Intention	Mobile	Survey	Correlation & Regression Analysis	211	Supported	
(Quoquabet al. 2018)	Switching Intention	Mobile	Survey	PLS-SEM	535	Not supported	Has an indirect effect through customer satisfaction
(Kumar et al. 2018)	Switching Intention	Mobile	Survey	Chi-Square Test & Cross Table Analysis	600	Not supported	Has an indirect effect through customer satisfaction
(Calvo-Porralet al. 2017)	Switching Intention	Mobile	Survey	SEM	370 (268 lock-in contracts; 102 free-contracts)	Not supported	Has an indirect effect through customer satisfaction

firms a direct effect of service quality on switching intentions. The authors concluded that most customers are willing to switch to another operator if they are not satisfied with the quality of service provided by their operator. Table 8 shows the results of the different studies.

In terms of quality of service, specific variables were identified in the different studies. Mobile network quality was identified as the most important reason for customers to switch from one operator to another (Mbarek and Baeshen 2019; Ahn et al. 2006) also tested the effect that the rate of dropped calls¹, and the rate of call failure², had on the probability of churn. The results showed that only the rate of dropped calls had a significant impact on the probability of churn, whereas the rate of failed calls did not have a significant effect on churn. Bhattacharyya et al. (2021), studying switching intention in mobile services, found that when network data speed improves, the customer's likelihood to switch decreases. They also observed that when network coverage problems decreased, the likelihood of switching decreased as well.

Examining churn in fixed Internet services, Madden et al. (1999) found that subscribers who selected their service provider based on network reliability were less likely to churn. The most important characteristic of the Internet service provider, besides price, is the reliability of the service. Miranda-Gumucio et al. (2013) also identified problems related to the lack of technical capacity as one of the main reasons for switching intention. Customers decide to abandon the service when they find there are problems with reception and network quality.

¹ Proportion of call drops a customer experiences out of the total number of call trials.

² Proportion of call failures a customer experiences out of the total number of call trials.

Studying switching intentions, Patro (2020) concluded that reliability (characterized by better service quality from competitors, ethical problems with the current provider, influence of family/friends, loyalty to other operators, and failure to deliver promises on time) and responsiveness (characterized by current lack of ability to resolve problems, provision of incomplete or inaccurate information, failure to provide information in a timely manner, unwillingness of staff to address the problem, and lack of response to customer suggestions) have a positive impact on customers wanting to switch mobile providers.

Regarding the number of complaints, studies show different results. Ahn et al. (2006) concluded that the higher the number of complaints, the higher the churn probability. Keramati and Ardabili (2011) found empirical evidence that the impact of complaints on churn probability is mediated by the customer's condition (non-use of services or suspension due to non-payment). On the other hand, Su, Shao and Ye (2012) found no empirical support for the effect of complaints on churn among VIP customers (high-value customers).

Studying fixed-line (internet, telephone) and mobile services, Lunn and Lyons (2018) found that shock resulting from bills that are higher than expected is strongly associated with switching operators, especially among customers who are more likely to switch. Similarly, Bhattacharyya et al., (2021) found that billing problems increased the likelihood of switching mobile operators. Miranda-Gumucio et al. (2013) found evidence that deficiencies in customer support are one of the main reasons for switching. One of the main reasons for dissatisfaction is that operators do not value their customers, which translates into poor customer service in branches and call centers, including a lack of courtesy or friendliness of the staff. Also, Becker et al. (2020) demonstrated that proactive post-purchase calls have a significant impact on customer churn.

On one hand, customer satisfaction can be defined as customers' evaluation of how well their expectations were met and their overall evaluation of their purchase and consumption experiences (Johnson and Fornell 1991). According to this view, the evaluation of a product or service evolves over time; it is viewed as an overall evaluation based on the total purchases and consumption experiences of a good or service over time (Fornell 1992; Johnson and Fornell 1991). It is derived from the function of several past satisfactions (Ekinici et al. 2008). On the other hand, from a transaction-specific perspective, customer satisfaction is considered an evaluative judgment following the choice of a particular purchase occasion (Oliver 1977, 1980, 1993).

According to the analysis of the articles in this literature review, several authors have found empirical evidence that the higher the customer satisfaction, the less likely the customer is to switch to a competitor (e.g. Becker, Spann, and Schulze 2015; Calvo-Porrá, Faña-Medín and Nieto-Mengotti 2017; Dey et al. 2020; Eshghi, Haughton and Topi 2007; Garcia-Mariñoso and Suarez 2019; Gerpott, Rams and Schindler 2001; Mannan, Mohiuddin, Chowdhury and Sarker 2017; Martins, Hor-Meyll, and Ferreira 2013; Quoquab, Mohammad, Yasin and Abdullah 2018; Svendsen and Prebensen 2013; Sweeney and Swait 2008). However, there is one study in which the hypothesis that satisfaction directly impacts customers' willingness to switch was not confirmed (Yin et al. 2013).

Table 9 Studies with satisfaction as an independent variable to explain switching intention or churn

Author	Dependent Variable	Telco Type	Data collection techniques	Statistical analysis technique	Sample	Empirical Evidence
(Eshghi et al. 2007)	Switching Intention	Mobile	Survey	Tetrad Methodology & SEM	2861	OK
(Quoquab et al. 2018)	Switching Intention	Mobile	Survey	PLS-SEM	535	OK
(Martins et al. 2013)	Switching Intention	Mobile	Survey	SEM (Multi-group)	202 Brazil; 200 Germany	OK
(Calvo-Porrall et al. 2017)	Switching Intention	Mobile	Survey	SEM	370 (268 lock-in contracts; 102 free-contracts)	OK
(Mannan et al. 2017)	Switching Intention	Mobile	Survey	PLS-SEM	442	OK
(Maicas et al. 2009)	Switching Intention	Mobile	Survey And Secondary Data	Conditional Logit Model	221	OK
(García-Mariñoso and Suárez 2019)	Switching Intention	Mobile	Longitudinal Survey	Logistic Regression	4110	OK
(Svendsen and Prebensen 2013)	Churn	Mobile	Longitudinal Survey	Logistic Regression	1499 (wave 1); 976 (wave 2)	OK
(Dey et al. 2020)	Switching Intention	Mobile	Survey	SEM	861	OK
(Yin, Li, Li, & Wu, 2013)	Switching Intention	Mobile	Survey	SEM	228	NOT OK

Table 9 lists all the studies in which satisfaction was tested as an antecedent of switching intentions and churn.

As described by Zeithaml et al. (2003, p. 74), "...although they share some similarities, satisfaction is generally seen as a broader concept, while service quality determination focuses specifically on service dimensions. Based on this perspective, perceived service quality is considered a component of customer satisfaction." Zeithaml and Bitner (2000) state that satisfaction is influenced by the customer's perception of quality based on the dimensions that are part of the SERVQUAL model, namely reliability, responsiveness, safety, empathy and tangibles. As for satisfaction, it can result from aspects other than quality, and it can also be influenced by cognitive and affective causes. Zeithaml and Bitner (2000) also point out that customer satisfaction is influenced by attributes specific to the product or service, such as the price, quality and the benefits offered by the service, as well as the actual need to use the service. Variables that indirectly affect switching intentions through satisfaction were also identified: perceived value and service performance (Martins et al. 2013), corporate image (Calvo-Porrall et al. 2017), and customer service (Mannan et al. 2017).

Studying switching intentions in mobile services, Patro (2020) concluded that the dimension of "monetary value", characterized by competitors' lower international tariffs, better offers/promotions from other operators, tariffs with unlimited calls and SMS packages from other operators, better roaming offers and high-quality internet

services at a low cost, has a significant impact on switching intentions. The same author also found that the service payoff dimension, characterized by expensive value-added services, hidden charges, higher Internet rates, high rates and charges for calls, and billing errors or deduction of additional values, had a positive impact on switching intentions. Customers with a higher score on service pay-out had a greater intention to switch. Martins et al. (2013) concluded that a decrease, albeit small, in switching intentions can be expected when users perceive an improvement in the service received relative to the amount paid or a reduction in price while the level of service remains the same. Mbarek and Baeshen (2019) found a high correlation between communication costs and switching intentions when studying switching intentions for mobile services. 81% of respondents believe that communication cost is very important and therefore operators should review their pricing policies to satisfy as many customers as possible and beat the competition.

Gao et al. (2022) when studying mobile and fixed internet services, observed that customer affective experience, the component of customer experience that appeals to customers' inner feelings (Verhoef et al. 2009) has a positive impact on customer retention. Customer experience can be defined as the customer's direct and indirect experience with the brand across each stage of the customer journey (pre-purchase, purchase and post-purchase) and for all touchpoints (Lemon and Verhoef 2016; Sundbo and Darmer 2008; Verhoef et al. 2009).

3.3 Switching costs and barriers

Switching costs are important constraints that prevent customers from freely switching to other service providers (Su et al. 2012) and play an important role in switching behavior and customer loyalty (Keaveney 1995; Kim and Yoon 2004) as they prevent customers from freely switching to other service providers (Ahn et al. 2006). Switching costs can be classified into three main groups: Transaction costs, learning costs, and artificial or contractual switching costs (Klemperer 1987). Transaction costs are the financial costs directly associated with switching, such as the cost of installing/activating services with the new operator. Learning to use one brand may not be transferable to other brands of the same product/service, even if all brands are functionally identical. Learning costs refer to the effort that customers must make to achieve the same level of comfort and ease with the new product or service (Seo, Ranganathan and Babad 2008). Finally, artificial or contractual costs refer to costs that are intentionally created by a service provider, such as the costs associated with loyalty contracts, where if the customer breaks the contract before the specified time, they are subject to penalties.

Mobile number portability (MNP) allows a customer to switch telecom providers without losing their mobile number, i.e., The number is transferred from the old operator to the new operator. MNP is an important regulatory measure introduced to reduce switching costs and is believed to play an important role in promoting competition in the mobile market (Calvo-Porrall et al. 2017). Becker et al. (2020), studying switching intentions for mobile services, found that customers who had their numbers ported were less likely to churn, which can be explained by high perceived switching costs.

Mobile number portability is associated with two important attributes for the decision process to switch to another operator (Calvo-Porrall et al. 2017): the associated costs and the time taken to port the number. The authors examined switching intentions based on a sample of 442 mobile users and concluded that portability duration and associated costs were negatively associated with mobile churn rates. Moreover, an increase in portability duration and associated costs meant an increase in the cost of switching operators. Ahn et al. (2006) report that the introduction of mobile number portability in South Korea in 2004 led to a 20% increase in churn rate at the end of the year analyzed.

Seo et al. (2008), who studied churn in mobile services, concluded that mobile tariff complexity was positively related to churn. Customers using services more frequently have different usage patterns than other customers. This increases their transaction costs as they must spend more time and effort to find suitable tariffs adapted to their usage patterns. Customers who choose simpler tariffs have lower switching costs and are therefore more likely to churn. Keramati and Ardabili (2011) tested a similar hypothesis when investigating churn in Iranian mobile services but found no empirical evidence to support it. The authors reasoned that there were only two types of tariffs (with and without GPRS internet), and since Iranian users were still in the early stages of service adoption, this would not be considered a switching cost for most of them.

Seo et al. (2008) also found empirical evidence that users with more advanced terminals were less likely to switch services. More sophisticated handsets may increase transaction costs if customers have invested heavily in a phone with their previous provider, and they increase learning costs because more sophisticated phones tend to have more features that need to be relearned after switching to a new device.

Ahn et al. (2006) point out that in the mobile telecommunication service industry, membership card programs and the corresponding points are the main components of switching costs because all the benefits and points accumulated over time are lost when customers switch service providers. The results show that accumulated points have a negative impact on the probability of churn. The more points customers have accumulated, the less likely they are to switch providers. The opposite result was obtained by Su et al. (2012), finding that accumulated points were not significantly related to churn probability. Ahn et al. (2006) also investigated the effect of membership card programs. The results showed that these programs were not effective in reducing the churn rate. Furthermore, the authors found that customers with premium cards were more likely to churn than customers with “regular” cards. They concluded that customers with more benefits were more likely to churn.

Su et al. (2012) investigated the extent to which membership of a virtual network (VPMN) and family packages where subscribers have some kind of benefit (e.g. free communication for other virtual network users, in the case of the family only for the other family members) influences the likelihood of churn. When users switch service providers and leave the virtual network, they have to pay more to contact other members, and other members have to pay more to contact them, leading to higher switching costs. The results show that both variables are negatively related to the churn probability. Membership of VPMN networks or the existence of family packages reduces the probability of churn.

Martins et al. (2013) investigated the effect of the “contractual commitment” construct on the barriers to switching in loyalty contracts where the subscriber is contractually bound to the operator for a minimum period. The results found no significant relationship between the constructs. This could mean that operators in both countries (Brazil and Germany) do not impose very high penalties for contract termination, or more likely, consumers are not aware of such contractual locks, and therefore do not perceive their contracts as a barrier to change. Garcia-Mariñoso and Suarez (2019) analyzed the mobile service switching intentions of customers approaching the end of the loyalty period (i.e., when they could switch operators without any penalty and found that customers who were unaware of the approaching end of the loyalty contract were less likely to change than those who knew that the contract was about to end. In other words, distracted consumers, i.e., those who are unaware of the characteristics of their contract, are less likely to change. Gao et al. (2022) found that administrative lock-in impacts positively customer retention. Also, Becker et al. (2015) analyzed contract duration and found that the churn rate is much lower for clients with minimum-duration contracts (24 months). An increase in the churn rate at the end of the minimum contract was also observed.

Su et al. (2012) also tested the impact of mobile terminal contracts with expired loyalty periods (contracts where there was no penalty associated with the change) on the probability of churn among VIP customers (high-value customers). The results showed no significant relationship between the two variables. For that, the authors claim that VIP customers have different decision patterns, as they can easily pay for a mobile device if they really decide to change operators. Calvo-Porrall et al. (2017), studying the switching intention of mobile service customers, tested whether sector knowledge had a positive influence on churn. Customers with prior knowledge of available alternatives and options substantially reduce barriers to change, increasing the likelihood of switching to other operators. However, the results did not demonstrate a significant influence of this variable on change intentions. Calvo-Porrall et al. (2017) say that this result could be explained by the very nature of mobile services, easily available today. Another reason given is the fact that having more information available, or knowing better the competing alternatives, does not lead, in fact, to better services or offers. Lunn and Lyons (2018) studied the impact of expected savings on intentions to change. As might be expected, they found that households that did not expect savings from the move were less likely to move. However, there is no clear relationship between the level of expected savings and the strength of intentions to change.

Finally, Table 10 shows a set of studies that used switching costs and barriers to switching as explanatory variables for churn and switching intentions. As we can see, most studies validate the significant effect of this construct on change intentions and churn.

3.4 Tariff characteristics

This section summarizes the variables related to the characteristics of the tariff, unpaid amounts, overdue bills, payment method, type of tariff, discounts, and others.

Table 10 Studies with switching costs as an independent variable to explain switching intention or churn

Author	Dependent Variable	Telco Type	Data collection techniques	Statistical analysis technique	Sample	Direct Effect	Indirect Effect
(Dey et al. 2020)	Switching Intention	Mobile	Survey	SEM	861	NO	OK
(Quoquab et al. 2018)	Switching Intention	Mobile	Survey	PLS-SEM	535	OK	
(Mahajan et al. 2017)	Churn	Mobile	Secondary Data			Alternative attractiveness has support. Sector knowledge did not pass the test	
(Calvo-Porrall et al. 2017)	Switching Intention	Mobile	Survey	SEM	370 (268 lock-in contracts; 102 free-contracts)	Alternative attractiveness has support.	
(Kumar et al. 2018)	Switching Intention	Mobile	Survey	Chi-Square Test & Cross Table Analysis	600	OK	
(Mannan et al. 2017)	Switching Intention	Mobile	Survey	PLS-SEM	442	OK	Indirect effect through satisfaction
(Becker et al. 2015)	Churn	Fixed Line broadband	Survey and Secondary Data	Chi-Square Test	1342	OK	
(Martins et al. 2013)	Switching Intention	Mobile	Survey	SEM (Multi-group)	202 Brazil; 200 Germany	NO	OK
(Svendsen and Prebensen 2013)	Churn	Mobile	Longitudinal Survey	Logistic Regression	1499 (wave 1); 976 (wave 2)	OK	
(Yin et al. 2013)	Switching Intention	Mobile	Survey	SEM	228	NO	OK
(Seo et al. 2008)	Churn	Mobile	Secondary Data	Logistic Regression Model & Two-Level Hierarchical Linear Model (HLM)	30,572	OK	

Looking at customer payment behavior, Maicas et al. (2009) investigated whether customer bill payment has a significant effect on switching intentions. The results showed that the effect was not statistically significant. Ahn et al. (2006) investigated whether the unpaid amount has an effect on churning and found no significant effect. The same result was obtained for the number of unpaid monthly bills, and no effect on churn was found.

Regarding monthly bill amounts, which is considered one of the most popular behavioral predictors of churn (Su et al. 2012), a statistically significant positive effect on churn was observed in all studies where this variable was identified (Ahn et al. 2006; Gerpott and Meinert 2018; Keramati and Ardabili 2011; Madden, Savage and Coble-Neal 1999; Su et al. 2012), i.e., the higher the monthly expenditure, the higher the probability of churn. Su et al. (2012) examined not only the total value of monthly billing but also the monthly value of data services separately for the churn of VIP customers (high-value customers) and found no significant relationship between monthly billing and the probability of churn. In terms of payment type, pre-payment and post-payment, the results showed that post-payment had a significant, positive impact on churn probability. Also regarding payment types, Ahn et al. (2006) investigated whether there was an impact on churn depending on the payment being made by direct debit or not. No significant effect on churn was found.

Regarding prepaid or post-paid mobile contracts, Maicas et al. (2009) found that customers with post-paid plans were more likely to churn than customers with pre-paid plans. In terms of tariff type, Iyengar et al. (2011) examined the impact of pay-per-use (PPU³) and two-part tariffs (TPT⁴) on the likelihood of churn and concluded that pricing structure does not have a direct impact on customer churn. What happens is that subscribers of TPT tariffs get less benefit from using the service compared to PPU tariffs, resulting in lower customer retention and usage.

Studying churn in mobile services, Wong (2011) investigated how tariff adequacy affects customer churn. The results showed that customers who used tariffs that were not optimized or appropriate for their consumption profile and therefore paid more were 1.150 times more likely to churn than customers with optimized tariffs. A similar result was observed by Jin (2022) when he verified that the switch intention to another operator significantly increases with the amount of monthly tariff over-spending. Differently, Gerpott and Meinert (2018) investigated the extent to which discounted tariffs affect churn on mobile services. They found that customers with discounted tariffs had a 56% lower propensity to cancel their contract than those who paid regular tariffs. They also concluded that subscribers on newer plans were less likely to cancel their contract than those on older plans. Furthermore, mobile operators regularly communicate the benefits of their latest tariffs so that subscribers to these tariffs can remember the arguments that led them to choose them. As such, customers with older tariffs are no longer sure or convinced that they have a tariff that meets their needs, which could justify the result described above. On the topic of different tariffs, Ahn et al. (2006) analyzed the impact of different tariffs on churn for mobile services. They tested four different tariffs: (1) tariffs only for members

³ There is no contract, no fixed monthly fee, and payment is based on usage.

⁴ Subscribers pay a monthly access fee and a marginal price per use.

of the brand's loyalty program with special rates; (2) tariffs with optional calls, with discounts for a certain predefined area; (3) tariffs for teenagers or young adults with a lower monthly fee and longer usage time; and (4) regular tariffs. It was found that subscribers with tariffs with optional calls were less likely to switch. Subscribers to tariffs for teenagers or young adults were more likely to churn. The age factor certainly has an influence here, as younger people and those with higher service usage are more likely to switch mobile operators.

With regard to 'unlimited' tariffs with voice minutes and/or SMS and/or mobile data tariffs, Gerpott and Meinert (2018) found that subscribers who switched from regular tariffs to tariffs with unlimited voice and/or SMS minutes were significantly less likely to churn, at 34% and 75% respectively. There was no significant effect when switching to plans with unlimited mobile data. One possible explanation put forward by the authors is that the incremental increase in mobile data volume in the new tariff does not adjust to the subscribers' data consumption needs.

Finally, we have limited ourselves to analyzing the variables used to answer the main research question "What are the determinants of churn in bundled telecommunications services?" First, it is important to contextualize the telecommunications market in a bundle. A telecommunications company offers bundled services when it sells two or more different products in a bundle for a single price (Prince and Greenstein 2014). We can define bundled offers⁵ as commercial offers for two or more of the following services: (1) Fixed Internet; (2) Fixed Telephone; (3) Mobile Services (including voice and/or Internet); and (4) television.

The relevance of studying markets for bundled services as opposed to pure services stems from the fact that bundled services have become the predominant way of using telecommunications services (de Matos et al. 2018). According to the report of the Directorate General of Content and Technology of the European Commission, the penetration of bundled service offerings is gaining momentum in several countries, with Malta, France, Portugal, the Netherlands and Greece showing higher rates of up to 80% in 2017. If we consider rates above 70%, we have 11 countries, and above 50% we have 18 countries. This shows the importance of bundled services in different countries.

Service bundles can be an important solution for telecommunication operators to minimize churn because service bundles would increase switching costs for consumers (Uner et al. 2015). For example, if a person who has a bundle of mobile, television, fixed Internet, and landline wants to switch service providers, they must switch all four services rather than just one. This process can be very complicated, resulting in individuals not switching service providers.

The six studies that looked at bundled services or the combination of fixed and mobile services found that they had an impact on both switching intentions and churn (Garcia-Marinoso and Suarez 2019; Gao, de Haan, Melero-Polo, and Sese 2022; Grzybowski, Liang and Zulehner 2021; Lee 2017; Lunn and Lyons 2018; Prince and Greenstein 2014). The results are presented in detail in Table 11.

⁵ Service packages are defined based on the report of the Body of European Regulators for Electronic Communications: https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5047-berec-document-on-indicators-on-bundles.

3.5 Customer-related variables

Several customer-related variables are also highlighted in the literature as determinants of customer churn. Customer seniority (also known as tenure) is the most prevalent variable in this theme. Keramati and Ardabili (2011) postulated that customer seniority was negatively related to the likelihood of churn, but the results showed no significant relationship between the variables. In contrast, Seo et al. (2008), Su et al. (2012), Gao et al. (2022) and (Jin 2022) found that the greater the customer's seniority, the lower the probability of churn in mobile services.

Lunn and Lyons (2018), examining past churn behavior in relation to customer seniority, concluded that landline customers who have never switched operators and have more than three years of service have a significantly lower intention to switch than customers who have switched in the past and have been with the current operator for a relatively short period of time. With respect to mobile customers, the authors found that the longer customers' tenure the less likely they are to switch, but that past switching experience appears to be less important. Garcia-Mariñoso and Suárez (2019) also examined the impact of prior switching and concluded that it has a positive impact on switching intentions. Customers who had switched providers in the previous year were twice as likely to switch providers in the following year compared to customers who had not previously switched. Apparently, there are different types of consumers: those who are more active and more likely to switch, and those who are more passive. Su et al. (2012) confirm this idea, concluding that participants who have switched providers in the past are more likely to switch again. Gerpoot and Meinert (2018) did not examine past switching behavior, but rather those customers who had already tried to cancel their provider but were convinced to give up. The authors concluded that these customers had a 35% higher switching probability than those who had never tried to cancel their provider.

The question of different types of consumers also leads us to the study by Quoquab et al. (2018), who investigated switching intentions for mobile services. They concluded that customer innovation, i.e., the user's intrinsic motivation, the personality trait of making more active exploration and having higher expectations, has a significant impact on switching intentions. The more innovative customers had higher switching intentions. In this connection, Maicas et al. (2009) concluded that more "savvy" consumers (i.e., those with extensive knowledge of the service offered by the operator and its features) are more likely to switch operators. Eshghi et al. (2007) investigated the extent to which the 'wireless orientation' construct, a latent variable characterized by the two manifest variables of 'Propensity to add Cell Phones' and 'Propensity to replace Fixed with Wireless', influences mobile service switching intentions. Interestingly, the results showed a positive and relatively strong relationship between customers' greater wireless orientation and their propensity to switch providers.

Ahn et al. (2006) concluded that customer status (active, inactive, and suspended for non-payment) had a significant impact on churn, with a change from active to inactive or suspended status increasing the probability of switching by 14.7 and 4.5 times, respectively. Moreover, Keramati and Ardabili (2011) concluded that customer status (active or inactive) mediates the relationship between churn and the

Table 11 Findings about bundle services in the literature

Author	Dependent Variable	Telco Type	Article type	Country	Methodological approach	Data collection techniques	Statistical analysis technique	Sample	Findings
(Gao et al. 2022)	Churn	Fixed Line broadband, Mobile	Empirical	Europe	Quantitative	Secondary data	Multinomial Logit Regression	13,761 customers	-The results show that customers who have acquired mobile and broadband services in a bundle form tend to remain with the focal firm regardless of the level of affective customer experience. - Consumers with bundled fixed and mobile services from the same provider are less likely to churn; - If customers with fixed services did not bundle mobile services, their annual churn would increase from 8.4 to 9.2%. In addition, the churn of mobile service consumers would increase from 11.5 to 13.1%; - Multiple telecom services have a moderate impact on consumer retention in both fixed and mobile networks.
(Grzybowski et al. 2021)	Churn	Bundle services (also had single services)	Empirical	Europe	Quantitative	Secondary data	Logit Regression	9,577,664 fixed broadband subscribers; 14,189,887 mobile subscribers	- Consumers with bundled fixed and mobile services from the same provider are less likely to churn; - If customers with fixed services did not bundle mobile services, their annual churn would increase from 8.4 to 9.2%. In addition, the churn of mobile service consumers would increase from 11.5 to 13.1%; - Multiple telecom services have a moderate impact on consumer retention in both fixed and mobile networks.

Table 11 (continued)

Author	Dependent Variable	Telco Type	Article type	Country	Methodological approach	Data collection techniques	Statistical analysis technique	Sample	Findings
(García-Mariño and Suárez 2019)	Switching Intention	Mobile	Empirical	Spain	Quantitative	Longitudinal Survey	Logistic Regression	4110	<ul style="list-style-type: none"> - The more dissatisfied consumers are, the more likely they are to switch operators; - Bundling mobile access with fixed line services had a negative effect on switching; - When the convergent bundle did not include additional mobile lines, the odds of switching were reduced by about a quarter, while the odds for a bundle with multiple mobile lines, was even lower, halving the probability of switching; - Bundling mobile services with fixed-line services increased customer retention, especially when the convergent package included multiple mobile lines; - Switching providers, intensive mobile data usage and having a contract with an operator other than the incumbent also have a positive effect on switching.

Table 11 (continued)

Author	Dependent Variable	Telco Type	Article type	Country	Methodological approach	Data collection techniques	Statistical analysis technique	Sample	Findings
(Lunn and Lyons 2018)	Switching Intention	Fixed Line broadband, Mobile, Landline Telephony	Empirical	Ireland	Quantitative	Survey	Logistic Regression & Ordered Logit Models	1039	<ul style="list-style-type: none"> - Long-time subscribers who have never switched carriers are extraordinarily resistant to considering switching; - Billing errors are closely related to switching intentions when customers are already leaning towards switching; - Switching is positively related to intention to switch, especially for values above 20% savings; - Evidence on the impact of bundling on switching intentions is mixed. Bundled services appear to be associated with low switching intentions among customers who are at least somewhat open to the idea of switching operator; - People who work from home are less likely to switch service. Customers over 55 are more likely to switch internet and telephone services, but not mobile services. The pattern is the opposite for younger consumers; - Households with children were more likely to switch; - Income, employment status and smart-phone use matter for some services.

Table 11 (continued)

Author	Dependent Variable	Telco Type	Article type	Country	Methodological approach	Data collection techniques	Statistical analysis technique	Sample	Findings
(Lee 2017)	Switching Intention	Bundle services (also had single services)	Empirical	Korea	Quantitative	Survey	Logistic Regression	1000	<ul style="list-style-type: none"> - Internet service subscribers who had previously bundled services were 25% less likely to switch service; - Families with two or more members are less likely to switch service providers; - Demographic variables such as gender, age and marital status have no statistically significant effect on switching; - The results show that service bundles with four or more services may make it more difficult to switch to another service provider compared to service bundles with two or three services; - The results provide empirical evidence that service bundles increase switching costs and are therefore less likely to switch service providers.

Table 11 (continued)

Author	Dependent Variable	Telco Type	Article type	Country	Methodological approach	Data collection techniques	Statistical analysis technique	Sample	Findings
(Prince and Greenstein 2014)	Churn	Bundle services (also had single services)	Empirical	US	Quantitative	Survey	Dynamic linear probability panel	49,847 (2007); 47,608 (2008); 36,194 (2009)	<ul style="list-style-type: none"> - Bundled services reduce churn for the three services that make up a triple-play bundle; - More and more families seem to see broadband internet as a replacement for television, implying a smaller package effect on broadband churn; - Families with bundles of services may have different behaviors in other relevant dimensions, including the propensity to exchange services; - Companies need to market their bundles at relatively low entry prices when families recognize an increase in switching costs that bundles of services impose.

cause of churn, suggesting that a change in customer status is an early sign of switching behavior.

Maicas et al. (2009) found a positive relationship between the purchase of additional services from the mobile operator and the likelihood of switching providers when investigating switching intentions for mobile services. They concluded that customers who purchase additional products/services tend to be less loyal.

In terms of the mobile devices themselves, Ahn et al. (2006) found that customers with devices that have access to the Internet were less likely to switch. Regarding the generation of the mobile network, Jin (2022) observed that users with the fourth generation of mobile internet (4G) were less likely to switch operators when compared to 2G or 3G users. In terms of device brand, no significant relationship was found with churn likelihood. Becker et al. (2020) found that customers who had purchased a mobile device when signing a mobile contract were more likely to intend to switch to another operator. According to the authors, this result was to be expected, as the purchase of hardware entails possible causes of churn.

Other variables related to customer attitudes were also identified. Customer loyalty, loyalty commitment, continuity commitment and word of mouth. Reviewing the factors influencing churn in the telecom sector, Mahajan et al. (2017) identified customer loyalty as one of the explanatory variables of churn. They conclude that loyalty is the result of a positive service experience, which in turn gives customers confidence in their service provider, encouraging them to use services more consistently and preventing them from transferring their loyalty to competitors. The likelihood of a loyal customer switching providers is low, resulting in a low churn rate. The authors state that there is an inverse relationship between loyalty and switching.

Sweeney and Swait (2008), in their study of switching intentions in landline telecommunications, examined the effects of loyalty commitment (LC) and continuity commitment (CC) on switching intentions. Loyalty commitment resembles affective commitment and reflects a psychological attachment to the relationship partner. In contrast, continuity commitment reflects an evaluation of the costs associated with switching and an associated recognition of the need to maintain the relationship in the face of the perceived costs of switching or the lack of viable alternatives. The results show that LC and CC have a significant impact on switching intentions. The greater the commitment to loyalty and the commitment to continuity, the lower the switching intentions.

One of the most widely held assumptions in this field is that word of mouth plays an important role in shaping consumer attitudes and behavior (Brown and Reingen 1987). Yin et al. (2013), studying a sample of 228 mobile phone customers in China, tested WOM as a predictor of switching intentions in their model but found no support for this hypothesis.

3.6 Service usage

In the “service usage” theme, we grouped the variables directly related to this aspect. The minutes used per month, number of calls, monthly use of mobile internet, type of use, use of value-added services and others.

Keramati and Ardabili (2011) and Gerpott and Meinert (2018) found that mobile voice usage (number of monthly minutes, number of calls) is negatively associated with churn. More specifically, a 10% increase in mobile voice usage is associated with a 38% decrease in the likelihood of churn (Gerpott and Meinert 2018). Regarding the number of distinct calls, that is, the number of different individuals the subscriber contacts, no empirical evidence was found of a significant effect on churn (Gerpott and Meinert 2018). However, when studying mobile churn among VIP customers, Su et al. (2012) found a significant effect on churn. When the number of unique calls increased, customers tended to stay with their current provider.

In contrast, different results were observed with respect to SMS, but the time lag between studies and the development of new technologies might contribute to the understanding. Keramati and Ardabili (2011) found empirical support that the frequency of SMS sending has a significant impact on churn. The higher the frequency of sending, the lower the probability of churn. In contrast, Gerpott and Meinert (2018) found no statistically significant effect between changing SMS usage and churn. The authors suggested this result could be explained by the decreasing use of SMS, as other types of applications are used for messaging (e.g. WhatsApp, Facebook Messenger, Instagram and others). Yin et al. (2013) studied switching intentions in a sample of 228 mobile subscribers and found that usage habits did not correlate with switching intentions. Mahajan et al. (2017), in their review of the determinants of customer churn in telecommunication companies, also identified usage patterns (minutes of usage, SMS) as a factor influencing churn. Su et al. (2012) found that monthly data usage for Internet access has a significant impact on churn, using a sample of 23,124 mobile customers. Users with higher monthly data usage for internet access were less likely to churn. Gerpott and Meinert (2018) and (Jin 2022) confirmed this result.

Madden et al. (1999) observed a significant effect between the type of primary Internet service use and churn when examining churn for fixed Internet services. The authors concluded that individuals who use the Internet primarily for work are more likely to churn. Garcia-Mariñoso and Suárez (2019) used the frequency of video views on smartphone as a proxy for data-intensive use in their longitudinal study of mobile service switching intentions. The results showed that this variable had a positive impact on switching intentions.

Also related to service usage, Wong (2011) examined the impact of value-added service usage on churn. With a sample of 11,525 mobile subscribers, the author found that the effect of this variable on churn was statistically significant but practically irrelevant.

3.7 Market environment

Here, the variables related to the market environment and company characteristics are included. Variables such as competitors' marketing communications, advertising campaigns, the attractiveness of competing alternatives, and brand image are addressed next.

Calvo-Porrall et al. (2017) found that the attractiveness of market alternatives (customers' perceptions of the extent to which viable competing alternatives are available

in the market) has a significant impact on churn when investigating switching intentions for mobile services in Spain. The authors examined the switching intentions of customers on contract and those not on contract (free contracts), and in both cases, perceptions of competing alternatives had a positive effect on churn, although it was more pronounced for free contracts. When customers feel that competing firms offer better services that are worth more than their current benefits, their intention to switch increases (Keaveney 1995; Yin et al. 2013) reached a similar conclusion when examining switching intentions for mobile services in China. In contrast, Mannan et al. (2017) came to the opposite conclusion when they examined switching intentions for mobile services in Bangladesh, finding that the direct effect of alternatives' perceived attractiveness on churn was not significant. One possible explanation given by the authors for this result is that customers either do not find other providers' services attractive enough or they perceive all providers to be similar. Patro (2020), analyzing switching intentions for mobile services, found that the affordability dimension (characterized by the variety of services offered by competitors, the availability of better tariffs, the availability of 4G services, the convenience of access and the ease of use of competing services) did not have a significant effect on churn.

Becker et al. (2015) studied churn in fixed internet services, analyzing competitor advertising expenditure (TV, radio, press, online, direct marketing, billboards) to capture customer exposure to competitors' advertising, and concluded this has a significant impact on churn. Miranda-Gumucio et al. (2013) identified advertising campaigns as one of the most influential aspects in the switching decision in their study of switching intentions for prepaid mobile services. Customers will stop using services if there is a lack of innovative promotions, if they have had negative experiences with rewards and promotions, or if the operator discontinues existing programs and/or promotions.

Svendsen and Prebensen (2013) investigated the influence of brand image on mobile customer churn in Norway under the variable "Company Attributes". The results showed this had a significant effect on churn, suggesting that a strong brand image makes companies less vulnerable to change caused by low satisfaction. Moreover, in their literature review, Mahajan et al. (2017) identified brand image as one of the determinants of customer churn in telecommunications.

Studying switching intentions in mobile services, Patro (2020) concluded that the technological dimension, characterized by a lack of plan updates, roaming issues, voice quality issues, poor internet access, network coverage issues, and new technologies introduced by other service providers, did not have a significant impact on switching intentions.

4 Conclusion

This study provides an overview of the state of the art regarding the determinants of customer churn and switching intentions in the telecommunication sector. It considered the contributions of 37 articles published between 1999 and 2022 and organized the determinants identified into seven themes, which were discussed in detail in the previous sections. Literature reviews can not only map current knowledge on a topic,

building on the articulation of the scattered literature, but also, and perhaps more importantly, point out research gaps and opportunities for future work. These are analyzed in detail below.

4.1 Research gaps and avenues for future research

This section identifies the main gaps found in the literature, providing a list of research questions that can be explored in the future.

One main gap found in the literature is the lack of holistic views on customer churn and switching intentions in the telecommunication sector. Indeed, this study revealed two streams of research, which despite their clear complementarities and overlaps, tend to evolve independently from each other. While some studies focus on the determinants of subscribers' switching intentions, considering factors such as satisfaction and attitudes (e.g., Banda and Tembo 2017; Calvo-Porrall et al. 2017; Kim and Yoon 2004; Mannan et al. 2017; Svendsen and Prebensen 2013), others consider subscribers' actual change behavior and explain it by considering behaviors and characteristics drawn from internal customer management systems (e.g., Ahn et al. 2006; Gerpott and Meinert 2018; Jin 2022; Keramati and Ardabili 2011; Seo et al. 2008). These studies provide rich evidence on the determinants of churn and switching intentions, but clearly none offers an overall view of what explains churn behavior and intentions. By categorizing the determinants of churn, this article can be a starting point for holistic approaches to the phenomenon. The fact that several determinants were tested by only one or a few studies also demands further validation, preferably enabling the comparison of the relative importance of a relevant battery of independent variables.

Another evident gap in the literature refers to the type of telecommunication services studied so far. Although bundled services are the most widely used type of telecommunications services today, most research focuses on mobile telecommunication services and very few studies (e.g., Carrizo-Moreira et al. 2017; Prince and Greenstein 2014) have analyzed churn and its antecedents in the telecommunications multiservice sector. Arguably, bundled service customers have different expectations and needs from a mobile service customer, which affect their decision process – both in acquiring a service and in deciding to terminate it. Hence, future studies should further analyze consumer behavior regarding bundled telecommunication services, particularly in the determinants of churn behavior and intention.

Another gap found in the literature refers to the theories and models guiding research so far, which are commonly associated with service quality (e.g., satisfaction, number of complaints, customer care) and with switching costs. Still, other consumer behavior theories and models could be considered to understand the topic better, such as interpersonal influence theories, personality traits, human values and cultural differences, to name but a few. Other theories must also be applied to study of the phenomenon. Economic and business theories must be used to explain the phenomenon from another point of view. It should also be noted that the adoption of strong theoretical underpinnings could help solve contradictory results, for instance, regarding the role of socio-demographic variables on switching intentions and churn behavior. As noted above, socio-demographics comprise the most popular theme of

churn determinants explored by the literature, and significant impacts of customers' characteristics (e.g., gender) on switching intentions and churn are commonly reported. However, use of this type of determinant seems empirical-driven, as strong theoretical support for, for instance, expected gender differences regarding the matters discussed are usually missing. Additionally, although switching intention is a particularly relevant indicator for managers and their customer retention efforts, apparently the expected gap between intentions and behavior needs to be further explored in future research. Again, the use of consumer behavior theories and models can make interesting contributions to the literature.

The fact that most studies analyzed in this review adopted quantitative approaches (e.g., logistical regression and structural equation modelling) was expected, given the focus on the determinants of a behavior. Still, one could point out a methodological gap in the extant literature, considering that other methodological approaches such as interviews, focus groups or experimental design could help unveil important aspects of this phenomenon and provide opportunities to validate results and understand controversial findings. Additionally, longitudinal studies would be interesting to understand switching decisions over time.

Table 12 summarizes the gaps found in the literature and provides suggestions of research questions that can be addressed in the future.

4.2 Implications for managers

This study identifies numerous variables that should be under the watchful eye of management. The results show there are multiple factors, and their complex relationships, that influence customer churn. Looking at the main variables identified, it could be argued that service quality per se does not have a direct impact on customer churn, but rather an indirect effect through satisfaction.

In terms of socio-demographic variables, particularly age and gender, as we saw earlier, there is no prevalence of conclusions in the same direction. The conclusions are varied, with a slight prevalence of cases where the variables had a significant impact on switching intentions or churn itself. Thus, we recommend that management should analyze its churn rates according to these variables.

Looking at switching costs and barriers, we conclude that most studies agree these factors are important in restricting consumers from changing operators. Therefore, mechanisms such as loyalty contracts and loyalty programs should be developed with associated bonuses/points, more complex service plans, among others. This would mean increased transaction costs, learning costs and artificial or contractual switching costs, thus reducing the propensity to change. One of the most important variables is loyalty contracts, which is why we recommend developing proactive actions before the customer ends their loyalty contract, proposing its renewal, with associated benefits. It is also interesting to note that the impact of loyalty contracts (administrative lock-in) is not the same according to the customer's experience. When customer experience is poor, lock-in helps firms to reduce customer churn significantly. When customer experience reaches an acceptable level, this difference turns out to be insignificant. Management must also look carefully at its customers' profile in terms of service use, but also in behavioral terms. Customers using more

Table 12 Literature gaps and suggested research questions

GAP	Proposed research questions
Lack of holistic views on churn and switching intention	<ul style="list-style-type: none"> – What is the relationship between the customer journey, switching intention and churn? – How does customer experience affect switching intention and churn? – What are the moderator factors that affect the impact of switching intention on churn? – What are the effective strategies to retain dissatisfied subscribers? – What are the reasons that lead a customer with a high switching intention, not to change operator?
Lack of studies on bundle telecommunication services	<ul style="list-style-type: none"> – What are the determinants of switching intention and churn in a bundle telecommunication service? – What is the impact of time to end loyalty contract on churn? – How do bundle service combinations affect churn? – What is the impact of loyalty contracts on switching intention and churn in bundle telecommunications services? – Do profile variables such as tenure, usage type, bundle value, payment method, or complaints impact switching intention and churn on bundle services?
Lack of diversity in theories and models	<ul style="list-style-type: none"> – How does culture affect switching intentions and churn behaviors? – How does the importance of certain churn determinants vary across cultures? – What are the expected impacts of personality traits and human values on switching intentions and churn behaviors? – How does Theory of Planned Behavior explain operator switching? – How does consumer familiarity with technology affect switching intention and churn? – What is the power of NPS to predict churn? – Can economic and business theories complement theories of consumer behavior to explain churn?
Lack of diversity in the methodological approaches	<ul style="list-style-type: none"> – What is the role of generational differences in change behaviors? – How do switching intentions vary over time? – Do customers who subscribe to the service based on positive recommendations have different churn behavior over time? – How is churn decision processed? – What characterizes the customer journey of a service switcher? – What is the role of interpersonal influence (e.g., digital influencers, electronic word of mouth communication) in switching intentions and churn?

services (more minutes, SMSs, mobile data, number of calls, among others) tend to be less likely to churn. However, it is necessary to keep in mind that, consumer overspending positively impacts churn, so, operators have to make a trade-off between profiting from consumer overspending and reducing customer churn.

In behavioral terms, it is interesting, for example, to see if customers have already been customers in the past, having left and re-entered, if they have already expressed an intention to change operator in the past, as these variables have an impact on swapping service provider. For example, customers can be segmented according to these criteria, and there are specific actions for each customer segment. Within the customer profile, tenure is also a major factor in the change, as customers with more seniority are less likely to leave.

Concerning the characteristics of the tariff, we also recommend that management should look carefully at the different profiles. Regarding mobile services, the difference between prepaid plans and post-paid plans must be considered, as the analysis showed that prepaid plan customers are more likely to change. One possible strategy is to promote migration from prepaid to post-paid plans. Likewise, customers who are on tariffs not adjusted to their profile are also more likely to change operator, so there must be careful analysis by management, to correctly allocate these customers to a tariff that matches their consumption profile. Minimizing customer expenses can be seen as a sign of fairness and transparency, forming the basis of a successful long-term relationship.

Bundled services, as mentioned above, are the most recurrent form of subscription to telecommunications services today. The study also indicates that customers who have bundled services are less likely to change operators, so companies should actively promote customer migration to bundled services.

Managers must also analyze the competitive environment, competitors' advertising messages, their promotional campaigns and the attractiveness of the alternatives presented. In line with expectations, this study reveals that these determinants have an impact on churn and switching intentions.

Finally, the significant availability of products and services, combined with highly competitive arenas in various business sectors as a result of stiff inter-firm rivalry, has caused a change in customers' behavior on churning decisions. Management of customer churn in sectors such as financial services, energy, healthcare, retail, subscription services, among others, can use the integrated framework developed in this study, to construct a research agenda, develop different retention actions and understand consumer churn behavior.

5 Limitations and future research

Although this research follows the principles of quality and rigor that should guide a scientific investigation, it is not free from limitations. First, it used only two important and renowned databases of scientific articles. Also, only scientific articles were considered, not including other types of documents (i.e., proceeding papers, working papers, book reviews, and book chapters). Only articles in English were considered. Thus, the use of other databases, other types of documents, and articles in other lan-

Table 13 Limitations and proposed future research

Limitation	Proposed future research
Keywords, Language, Used database	– Use of other keywords and other databases, including languages other than English
Exclusion of articles focusing on predictive models	– Make an RSL on this topic

guages may enrich future work. Second, this research excludes all articles based on a predictive churn model, as this was not the objective here. As such, we suggest that an SLR addressing this topic be carried out in the future. Still, in relation to the literature review and remembering that switching costs and barriers were the third theme with the most references identified, we also recommend carrying out an SLR on the estimation of switching costs. Below, Table 13 summarizes the study limitations and the proposals for future research.

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Declarations

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