Switching Behavior in Mobile Phone Sector: The Case of Mobile Number Portability in Morocco

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Abstract

Study goals and objectives: This paper attempts to study the impact of the implementation of the mobile number portability (MNP) on the holders of mobile numbers (postpaid and prepaid) in Morocco by examining consumer perception and behavior towards Mobile Number Portability (MNP).

Study design, methodology and approach: This study collected data on subscribers who have switched mobile operators between the second quarter of 2016 and the second quarter of 2017. Data were collected and analyzed statistically using ANOVA (analysis of variance) and logistic regression.

The evaluation findings: The statistical analysis showed that subscribers find the switching barrier quite high, which still acts as a disincentive to make changes. Although mobile number portability (MNP) has significantly reduced switching costs, these are still quite significant. Mobile Telecommunication firms have identified the importance of switching barriers and customer loyalty in the process of setting up marketing strategies to retain their subscribers.

Limits on the search: The results show that MNP has directly affected industries on a larger scale, far more than subscribers, suggesting implications for regulators on the one hand, and industries on the other. Inevitably this raises a question: How to effectively implement MNP to reach the objectives and how to achieve competitive advantage with MNP?

Research value of the record: The paper advances our knowledge in the impact of industrial policy on consumer behavior in marketing, but we also noted a particular attention at the individual level, such as the behavior or perception of subscribers and their motivations for changing or remaining with mobile carriers (operators) with the introduction of MNP.

Key words:
mobile number portability, switching behavior, telecommunication service in Morocco, perception, competition.

1. Introduction

Mobile Number Portability (MNP) enables mobile telephone users to retain their mobile telephone numbers when switching from one mobile network operator to another. Thus, to the subscriber, MNP means to have the freedom to switch between and among the many service providers for telecom services. This measure promotes and spurs competition among operators by allowing consumers to switch service providers and to benefit from the best offers, while retaining their old and same mobile phone number. Therefore, mobile carriers will need to actively compete, and provide innovative as well as improved customer service, in order to retain and expand their subscriber base.

MNP is increasingly accepted as an integral part of a competitive environment and is being considered for introduction in a number of liberalizing countries J.Haucap, 2003[1].

Its purpose is to promote consumer choice and establish effective competition by allowing subscribers to switch between providers without incurring the costs or inconvenience of changing phone numbers.

This facility has been implemented in many developed and developing countries by enactment of special Acts and legal instruments in information systems environments. Starting in the mid-19th, many telecom regulators around the world proposed to implement the MNP as a tool for strengthening and reinforcing competition in the mobile market.

In Morocco, despite the introduction of competition in the mobile market, “the lock-in effect” has helped the incumbents retain market dominance. A certain market failure has allowed the persistence of certain choices. It was necessary to create an effective competition environment where both incumbents and new entrants can compete on a level playing field.

In this light, the MNP in Morocco was set up under the article 9 bis of law number 24-96, as amended and supplemented. Several decisions have been made since 2006.

The main regulatory objectives of MNP have been the benefits to consumers; Competition between operators is leading to lower prices. In particular, the availability of MNP is expected to bring substantial benefits to subscribers: lower prices, better choice, better quality and a wider range of services. This would allow subscribers to take full advantage of the choices that will become available in a more competitive telecommunications market. They will also be able to choose the provider that best meets their needs without incurring change fees by changing their phone number.

Despite the existence of many debates on the subject, and especially if MNP increases competition in mobile markets, a more fundamental question can be appended

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whether subscribers are able to switch carriers without significant switching barriers.

In this context, this study focuses on the response of subscribers to the MNP: the effects of MNP on the switching barrier, switching costs and customer perception, as well as the structural relationships between these factors among Moroccan mobile subscribers. This research is particularly focused on studying the effect of the introduction of MNP on subscribers' behaviors and perceptions, and therefore their motivations to change or stay with mobile operators (service providers) with introduction of the MNP.

Most studies on MNP highlight the industrial aspect of MNP. This study aims to complement existing ones by analyzing the consequences of MNP on subscribers. From this perspective, the core of the research question in this study is whether this regulation of MNP has achieved its intended objectives, particularly in changing costs and benefits to subscribers.

This investigation can be useful when [2] (Lee&al. 2007) find ‘‘brand effect’’ of MNP, which has adverse effect on competition in the mobile market. Then, the question is if such brand effect exists, how it affects the subscribers in their switching behaviors.

The document is organized as follows: The first section will be devoted to the characteristics of the Moroccan mobile market. The second section will review the literature reviews on MNP studies. The methodologies used for this study will be explained at sections: 3, 4 and 5. Sections 6 and 7 will present the results. Finally, the conclusions and future studies will be summarized in the eighth section.

2. The characteristics of the Moroccan market for mobile telecommunications services

The telecommunications sector in Morocco has undergone various changes that have contributed to its development: setting up the regulator, introducing new operators to the market, granting licenses... The brief history below presents some key dates of the evolution of the Moroccan telecommunications sector.

Table 1: Evolution of the telecommunications sector in Morocco

Dated	Action
1997	Enactment of law n° 24-96 on postal and telecommunications services.
1998	Creation of the National Telecommunications Regulatory Agency (ANRT)
1999	Provision of the 2nd GSM license to Medi Telecom
2000	Provision of two GMPCS licenses
2001	Provision of three VSAT licenses
2003	Provision of 2 3RP licenses and 4 other GMPCS licenses
2004	General guidelines for the liberalization of the telecommunications sector in Morocco for the period 2004-2008; Revision of law n°24-96 and its regulations of implementation.
2005	Mobile telephony market reaches 10 million subscribers; Provision of a new generation license to Medi Telecom for the establishment and operation of a fixed telecommunications network (local, national and international); Provision of a new generation license to Maroc Connect (today Wana Corporate) for the establishment and operation of a fixed telecommunications network (local, national, and international) with limited mobility; Launch of the GENIE program that embodies the Government’s strategy on generalizing and integrating ICT in education.
2006	Provision of three 3G mobile service licenses to Itissalat Al-Maghrib, Maroc Connect (today Wana Corporate) and Médi Telecom.
2007	Mobile telephony market reaches 20 million subscribers; Enactment of a law extending the authority of ANRT to manage the “.ma” Internet domain name and electronic certification; Implementation of certain regulatory controls (number portability, unbundling the local loop etc.).
2008	Launch of the PACTE program aimed at reducing the digital divide and serving all Moroccan rural areas yet covered by telecommunications.
2009	Provision of the third mobile license of the 2nd generation to Wana Corporate; Passage of the new national 10 digit numbering plan.
2010	Mobile telephony market reaches 30 million subscribers; Adoption of a General Guidelines Memorandum by the Agency’s Board of Directors in order to develop the telecommunications sector by 2013.
2011	New ANRT decision on terms and conditions of implementing number portability.
2012	Adoption of the national development plan For high and very high Broadband.
2013	Adoption of the National Frequencies Plan.
2014	Adoption of the decision regarding the technical and tariff modalities for the access to the civil engineering installations of IAM.
2015	Adoption of the Note of general guidance for the further development of the telecommunications sector by 2018; Assignment of three 4G licenses; Decisions on unbundling (physical, virtual and Bitstream) of the local loop and sub loop of IAM; Decision on the terms and conditions for the implementation of number portability, including the centralized database for ported number.
2016	Consultation for the implementation of the national development plan for high and very high Broadband; Opening of the prefix (07) for Mobile Telephony’s Numbering purposes; Launch of the public consultation for the selection of the entity responsible for the establishment and the operation of the centralized database for number portability.

Source: https://www.anrt.ma/en/indicateurs/secteur-des-telecoms-en-bref

During the second quarter of 2017, the global mobile telephony market reached 42.05 million subscribers in the mobile networks (2G, 3G and 4G). This market recorded increases of 0.64% during this quarter and 1.48% compared to the same period of the previous year.

Below are the official figures for the mobile phone market in Morocco:

- The penetration rate of mobile telephony reached 120.66% at the end of June 2017.
- The mobile subscriber fleets of the three operators recorded quarterly increases ranging from 0.18% to 1.51%. Over a year, the operators' respective fleets vary between -7.34% and 8.52%.
- The prepaid mobile phone market recorded quarterly increases of 0.44% and annual growth of 0.77% to reach 38.86 million subscribers.
- The post-paid mobile phone market has recorded quarterly increases of 3.11% and annual growth of 10.87%, to reach 3.2 million subscribers. These developments confirm the renewed interest and accessibility of postpaid offers, whose adaptation and affordability allow them to attract the interest of the consumer.

3. Other Studies on Mobile Number Portability

Most studies on MNP have developed from the competition framework on the network, mainly by adding change costs. Studies on the impact of the MNP on competition tend to have a macroeconomic perspective using economic analyzes.

Aoki and Small (2010) [3] is the most frequently cited research that directly investigates the effect of the implementation of MNP. This work has given the interpretation of the MNP as a reduction of the costs of change, accompanied by an increase in the fixed and marginal costs of the companies. Their analytic inquiry focuses on the MNP -driven welfare change among consumers and producers.

Similarly, Srinagesh and Mitchell (1999) argue that MNP has contributed significantly to effective competition in the US mobile market. [4] Gans & al. (2001) also believe that the MNP would encourage participants to search for and obtain socially effective results by giving consumers ownership of their phone number and the right to wear them.

Other studies highlight the negative aspects of MNP. [5] Reinke (1998) argues that while number portability can increase competition in the telecommunications market, the means by which portability is implemented can either provide or threaten competition and universal service.

[6] Buehler&Haucap (2006) also study the effect of MNP implementation on consumer welfare, while highlighting the associated limitations. The novelty of this research was the consideration of the effect of MNP on the level of information available to consumers. They argue that under the prefix number, the MNP has no indicative power. Callers are not able to distinguish between on and off-line telephone numbers and may end up paying higher than average bills. They also argue that the introduction of the MNP will benefit the incumbent and will harm the incumbent. [6]Buehler&Haucap (2006) focus on the analysis of fixed-to-mobile calls, ignoring the more difficult mobile-to-mobile case, which involves changes in market share.

Another current in the literature on the effects of MNP is to analyze client behaviors towards MNP. [7] Shin (2007) studies the effect of MNP in the United States by focusing on the perception and behavior of subscribers. [2] Lee & al. (2007), using the joint analysis technique to explain consumer preferences, find that variations in characteristics impact preferences and consumer choice, which makes MNP an important cause of lower switching costs. Similarly, Gerpott & al. (2001) [8] study the structural relationships between subscriber retention, subscriber satisfaction and loyalty of German mobile subscribers. Their findings show that customer support has a significant impact on subscriber loyalty, which influences the subscriber's intention to terminate / extend the contractual relationship with their mobile operator.

Lee & al. (2007) [2] assessed the impact of MNP on competition and social protection and concluded that MNP has achieved effective competition in the mobile market, but MNP has not contributed to social well-being . Few studies have been done to measure the effect of MNP at the subscriber level, leaving the notion of switching barriers in the dark.

This study aims to fill this gap by analyzing the current behaviors and perceptions of subscribers about MNP. The term switching barrier and subscriber behavior needs to be clarified. Thus, subscriber switching considerations with the MNP are closely related to the actual benefits and competitions offered to them.

4. Operational Definitions

For operational definitions of subscribers' behavior, our study will take into account the subscriber behavior factors of [8] Gerpott & al. (2001), [9] Kim & al. (2003), and Lee & al. (2007), which use three variables, namely retention, retention and customer satisfaction.

Based on these three variables, Kim & al. (2003) develop two factors: quality of service and switching cost, including 12 variables. Their variables are not mutually exclusive and are somewhat redundant. We cite the example of the quality of service factor where subscriber and service variables are redundant. To avoid the inter-correlation effect between variables, the 12 variables are simplified into three variables. A new subscriber lock variable is added to reflect the current counterparts of MNP operators. In addition, an opportunity cost variable is added to encompass concepts such as the cost of adaptation, replacement cost and the cost of loss (see Table 2).

5. Theoretical concepts and hypothesis development

5.1 Cost of switching

Switching costs occur when customers face the cost of transitioning to a market from a purchased product to one of its replacements (Krupp, 2005).
Switching cost is generally defined as a potential risk perceived by subscribers during the transition from one operator to another, which results in financial, functional, social, psychological and security losses (Dick & Basu, 1994) [10].
Important research focuses on economic theories and the practical implications of the costs of change in relation to different market structures (Jones & al. 2002) [11].

Table 2: Operational Definition and Variable Measurement

Factor	Variable	Operational definition	measuring items
Service	Call quality	Call quality according to subscriber perception	Call clarity, coverage
Switching barriers	- Value added services - Customer service - Switching cost - Opportunity cost	Type and convenience of the variety of services. Subscriber Assistance System. Financial cost carrier. Alternation lost by switching operators	Variety of value-added services; Easy access to subscriber services; Surcharge and fees to change supplier; Replacement cost of a mobile device; Concern about loss of benefits; Subscription fee for a new membership.
Price	- Subscriber Lock-in -Pricing structure - Pricing scheme - Additional service charge	Carrier specific service Pricing and price schedule Choice of price regime Fees for additional services	Contract or other credit; Reasonable price; Variety of price system; Activation, cancellation, settlement fees, etc.

Source: Gerpott & al. (2001), Kim & al. (2003) & Shin (2006)

When the subscriber makes a purchase decision, the initial costs are assumed to be the same in all firms (Klemperer, 1987) [12]. Additional costs are incurred in case of change, in a second time.
The switching costs borne by consumers are an excellent example to illustrate the market failure in terms of competition; subscribers thus remain limited and strongly linked to a particular operator, inevitably granting monopoly power to this operator. This lack of competition allows the seller to have complete control over the choice, quality and price of the products on the market, generally resulting in a decrease in production with inflated prices, which considerably reduces the choice and value of the products.
While most industries would not normally have the characteristics of a monopoly, such situations may arise as a result of market failures, such as high switch costs (Kim & al., 2003) [9].
This monopolization of the market becomes profitable for the operator because the cost of switching is a deterrent factor that keeps the subscribers blocked in their first purchase decision.

5.2 Subscriber lock-in

Service providers may attempt to "lock in" customers to prevent them from switching to other products, technologies, or providers.
Client foreclosure implies an increase in switching costs, so much so that the cost of switching outweighs the potential benefits of switching. This type of subscriber capture can take many forms, including: contractual commitments, bundling of services, product-specific learning costs, search costs, and loyalty programs. However, each of these industrial marketing policies represents the different ways in which switching and market monopolization costs are realized. The higher the cost of switching the operators in a particular market, the more the subscriber is seized or blocked in the original purchase decision. Also, the operator could increase the price of the service without significant loss of subscribers. Switching costs therefore generate consumer foreclosure, allowing operators to gain considerable monopolistic benefits. This form of subscriber capture is particularly effective when it is associated with a marketing phenomenon such as brand loyalty, where consumers are strongly motivated to make consistent decisions to purchase a product or product repeatedly. a particular service. In any market, a supplier competes for existing or potential consumers. While markets with high switching costs are used to retain existing subscribers, industry contendants argue that potential subscribers should provide a competitive discipline to resist overvalued products and services. This supports the often claimed phenomenon of reputation effects, used to signify the impact of the introduction of incomplete information on disturbance of equilibria. If it is known that suppliers will charge excess prices during switching, consumers can avoid these costs by buying from a different supplier in the first period.
It is clear that marketing policies used by various industries to attract customers and retain existing subscribers vary from market to market, but it is recognized that lower switching costs help to free

subscribers. With the introduction of MNP, Moroccan operators have offered tariffs and calling privileges for long-term users.

5.3 Hypotheses

As the literature review shows, there are several previous studies on: the relationship between customer satisfaction and customer loyalty (Shin 2007, Kim et al. Dick and Basu, 1994; Reichheld, 1996); the relationship of customer satisfaction and call quality (Keaveney 1995, Soderlund 1998, Gerpott & al. switching demand and MNP (Lee & al., 2004).
However, the relationship between factors and client switching has been rarely addressed.
Shin (2007) [7] studies the effects of MNP by focusing on the perceptions and behaviors of US subscribers on MNP. It is worth applying its approach to the Moroccan mobile context. The assumptions below are based on the relationships between the factors.
The perception of switching barriers is a clue in the assumptions, which leads us in this study, to explore switching behaviors of clients:
Hypothesis 1: There are significantly different perceptions about the switching barrier between the switching group and the non-switching group.
H1-a: A higher level of perceived switching barriers is related to a lower switching level.
H1-b: The higher price level is related to the higher level of switching barriers.
Hypothesis 2: There are distinct future intentions between the switching group and the non-switching group.
H2-a: A higher level of perceived services is related to the low switching level.
H2-b: A higher level of perceived switching barrier is related to a perceived higher level of service.

6. Design, preparation of the survey

Since there are several methods for collecting qualitative data (observation, protocol, group discussions, individual interviews), we need to identify the most appropriate method of collecting information for our research context.
We opted for the qualitative questioning by telephone, presenting numerous advantages, especially in terms of quality of interrogation, flexibility in the management of the ground, without forgetting the economic and logistic advantage that it presents.
Indeed, as specified by Pellemans (1999) "this technique is characterized by the definition of a maintenance scheme, by the preparation of a questionnaire containing all the topics to be addressed in a certain order".
In a field of research where publications relating to the subject are scarce, the collection of qualitative data allows us to clarify some areas of darkness and to meet certain objectives of deepening.
To do this, our sample consists of 560 interviewees divided into two groups of individuals: a group of people having changed their operator, and another group having not changed operator.

Table 3: Sampling and Data Collection

	Telephone survey	
	Switching group	**Non-switching group**
Total sample	441	870
Response	289	201

Our study uses a survey questionnaire derived from the Shin (2007)[13], which was developed from previous studies on MNP (Gerpott & al., 2001; Lee & al., 2004; Kim & al., 2005, 2003).
Through the telephone survey, subscribers were asked about the reasons for changes in their operator such as satisfaction, service, switching cost, lock and prices.

7. Data collection and processing

A total of 552 survey forms were collected after a three-month data collection. Of the completed survey forms, excluding those with omissions or repeated random responses, 490 validated responses were retained.
Descriptive statistical analysis, factor analysis and reliability analysis offered by SPSS software have been useful for our data processing. As for the regression analysis, it was done with the AMOS 4 software.
A factor analysis was performed to reduce the number of variables and avoid multi-colinearity (linear inter-correlation between variables). A principal component method with varimax rotation of the 11 variables reveals five underlying factors with an eigenvalue (characteristic value) greater than one (1). These five factors explained 67.8% of the variability in the 11 variables. A description of each factor and its corresponding variables are:
1. Service;
2. Price;
3. Switching cost;
4. Quality of the call;
5. Customer service.

A confirmatory factor analysis was performed on the data to analyze the validity of the constructions on the remaining units after removal of the elements disturbing the homogeneity of the whole (Table 4).

Table 4: Description of derived factors and corresponding variables.

Variables / factor	factor 1	factor 2	factor 3	factor 4	factor 5
Call quality	-0.908	-0.0447	-0.177	0.097	-0.039
Price movement	-0.905	-0.192	0.239	0.301	-0.032
Customer service	-0.754	-0.098	0.292	0.334	0.390
Switching cost	-0.129	0.801	0.011	0.013	0.293
Opportunity cost	0.110	0.823	0.130	0.049	0.0932
Subscriber lock-in	0.349	0.862	0.0811	0.325	0.301
Price structure	0.293	0.080	0.901	0.102	0.214
Pricing scheme	0.523	0.123	0.799	0.0092	0.0021
Other service charges	-0.423	0.224	0.901	0.0494	-0.046
Value added services	0.128	-0.231	0.283	0.398	0.025
Cost of adaptation	-0.082	0.032	-0.003	0.234	0.253
Subscriber loyalty	0.015	0.012	0.0084	0.134	0.0792
Mobile devices	0.024	0.029	0.0338	0.121	0.7623

Confirmatory factor analysis indicated that the factors were generally consistent with the validity assessment standards.

8. Results of the Survey

An adjustment of the model is performed to test the validity of the model (Table 5). Model sample evaluation defines the process that measures the adequacy of the level of similarity between the sample characteristics and its theoretical characteristics

Rather than deciding on a single statistical standard, the most widely represented value and the recommended optimal standard are roughly compared and the following decision is made: the Chi-square value (significant level, 0.05), the index Adjustment Quality (GFI 0.80), Adjusted GFI (AGFI 0.80), Normalized Fit Index (NFI 0.9), Comparative Adjustment Index (CFI 0.90) and Root Mean Square Residual (RMR 0.05). Table 5 shows that most index values address the general standards for the adjustment index.

The H1 (perception of switching barriers) test shows that there are different and significant perceptions of the transition between groups (Table 6). This triggers the first sub-assumption: The H1a test implies that the unchanged group of individuals usually has higher switching barriers than the one with change of operator. In addition, the H1b test shows that the price level is associated with the decision to change subscribers.

The H2 (future switching intent) test shows that there is also a different intention between the two groups. Then, the test of sub-hypothesis H2a is eliminated implying that the service factor is not a determining factor in their future intention. Another hypothesis of H2b is also rejected, which implies that better service is not necessarily associated with switching carriers

Table 5: Model fit index

Index of fit	Value
Chi-square	722.9
df	301
P	0.000
GFI	0.842
AGFI	0.893
NFI	0.922
CFI	0.808
RMR	0.122

Table 6: The results of the hypothesis tests

Hypotheses	Average difference	t-value	Meaning	Result
H1	0.233	3.314	0.003	Rejetée
H1-a	0.106	-1.390	0.028	Acceptée
H1-b	0.289	3.182	0.000	Acceptée
H2	0.539	3.248	0.001	Acceptée
H2-a	0.120	-0.248	0.791	Rejetée
H2-b	0.178	1.231	0.231	Rejetée

The student test (t test) is performed to corroborate the hypothesis tests. The results of the t-test show that the averages of the two groups are statistically different from each other. The P value further supports that the differences between the two groups are statistically significant, with the exception of the value-added service variable (Table 6).

The time of use and the calling frequency (Table 7) are two clearly distinguished variables in the two groups. Switching variance analysis shows that there are statistically different usage patterns in both groups. Subscribers in the switching group have a tendency to make calls more frequently, and subscribe to more and more diverse services; they also spend more time in the calls compared to the non commutative group. Conversely, subscribers in the non commuting group tend to be light user groups with less frequent calls, with only one or two additional services, and spend less call time. These differences in behavior between the two groups imply that the switching group tends to be more adaptable in case of change, more sensitive to quality of service and more willing to pay switching costs to optimize their needs than the other group.

The two most important factors for the switching group to change the operators shown in Table 7 are: price and switching cost.

Of those who changed carriers, 39% said they carried their number for a better price on the monthly service, and 10% changed to receive a sales promotion. 23% of respondents changed operators due to coverage or quality of service, which are considered the main reasons for widespread switching. The service factors show a higher influence than the switching barriers. Contrary to the commonly accepted notion, switching barriers were not significant factors. MNP was not in itself a reason for subscribers to switch operators, but it eased the hassle of switching.

Subscriber lock is the most important switching barrier that discourages subscribers from making decisions. Analyzes show that switched subscribers are generally satisfied with new services and operators. They are generally well informed about MNP.

About 71% of subscribers were satisfied or moderately satisfied with their carrier experience.

About 81% of subscribers indicated that the donor response time has met or exceeded their expectations.

On the other hand, the majority of non-commutative subscribers find that the switching barriers are higher than the switching group. Even after the application of the MNP, substitution barriers influenced the decision of subscribers.

In addition, subscriber locking is the second important factor that keeps subscribers with the original operator. Subscribers whose porting request was unsuccessful were locked out with a long-term contract, fees and memberships. These non-commutative subscribers benefited from a promotional discount when they selected the original operator, under a two-year contract. In addition, these subscribers were surprised by the hidden costs induced by the early termination (early cancellation fee).

Of the respondents, 14% said they stopped the change procedure after becoming aware of early cancellation fees. These subscriber lock factors have significantly discouraged subscribers from switching operators.

Table 7: Analysis of variance during switching

Variables	Commutative group		Non commutative group		t-value	p-value
	Average	SD	Average	SD		
Time of use / week	4.99	0.112	1.712	0.1103	3.1012	0.027*
Call frequency / week	70.224	0.213	26.23	0.1721	4.992	0.024*
Services in use	6.923	0.129	2.118	0.239	2.254	0.010**
Switching cost	1.270	0.440	5.092	0.430	-3.162	0.001**
Subscriber lock	3.342	0.340	4.002	0.233	3.2545	0.002**
The price	4.323	0.2123	2.194	0.242	4.274	0.001**
Opportunity cost	1.523	0.209	4.023	0.401	1.813	0.050*
Call quality	5.902	0.094	2.921	0.373	-3.041	0.002**
Subscriber service	4.121	0.132	1.202	0.129	3.312	0.001**
Value-added service	4.412	0.390	2.256	0.412	-0.8274	0.110
N.B: * p< 0:05; ** p < 0:01						

5% of non-commutative subscribers are totally unaware of the existence of MNP. Knowledge of MNP is not high, subscribers do not have a detailed understanding of the process, timing and cost of carrying. Most non-commutative subscribers had a simplistic view that MNP would be free and immediate.

About 7% of non-commutative subscribers responded that they would wait for some time until the costs of change were reduced.

9. Future Subscriber Intent: Logistic Regression

As the results show, the two groups are significantly different in switching behavior. This part of the study will focus more on whether these different behaviors will continue or change in the future.

To detail this question, we conduct logistic regression to measure the future intent of subscriber change.

Logistic regression, also called the logit model, is used in the presence of a variable to be explained (binary coded) and one or more explanatory variables.

Our dependent variable in logistic regression (also called the response or explain variable) is the switching intention (wear = 1, not to wear = 0), and the independent variables (explanatory variables) are the seven factors below (Table 8).

The two client groups were divided into four groups. The first group (n = 120) is a group of clients representing switching. The second group (n = 52) is the one that would remain without switching. The third group (n = 35) comes from a non-commutative group that wants to carry on in the future. The fourth group (n = 112) represents a group of customers that remains constantly unchanged.

Logistic regression results support ANOVA variance analyzes overall (Table 7). Subscribers in the non-commutative group are more likely to change when the switching barriers become weak. In particular, blocking subscribers is the most dissuasive factor for their change.

The subscribers of the non-commutative group perceive higher switching barriers than the switching group, as indicated in the subscriber lock. In addition, the non-commutative group is less incentivized or motivated by lower prices. Its members are interested in a lower price, but they think that the lower price would be offset by a high switching cost.

In fact, it is consistent after a series of analyzes, that the non-commutative group is less concerned by service quality levels and less responsive to price changes.

Table 8: Logistic Regression Analysis on an Independent Switching Variable

Factors	Independent variables	Commutative group			Non-commutative group		
		β	SE	p-value	β	SE	p-value
Switching barriers	Switching cost	0.0432	2.434	0.837	0.404**	11.568	0.002
	Subscriber lock-in	0.102*	1.556	0.0921	0.478**	1.621	0.017
	Opportunity cost	0.011	0.341	0.042	0.643**	0.344	0.018
Services	Call quality	5.19	0.862	0.410	-0.551	3.215	0.631
	Customer service	3.08	1.107	0.219	-1.119	2.122	0.849
	Value-added service	6.96**	0.867	0.159	-1.070	0.0164	0.364
Price		6.32**	0.212	0.011	2.124*	0.012	0.033
Constant		-3.351	-4.959	0.163	0.000*	-4.647	0.456
log likelihood			153.049			44.229	
Chi-square			142.955			68.032	
N.B : *< 0.05 ; **< 0.01							

Subscribers from the non-commutative group are the least likely to be affected by the service factor. Its users tend not to worry about their number; they just need to call in case of need. This observation is consistent with the variable according to which a non-commutative group tends to consider the value-added service as the least disturbing factor. Call quality is a critical factor for the non-commuting group in the future, but it is not significant considering the porting decision.

On the other hand, subscribers with switching experience are likely to change again if they find lower prices. These subscribers will also be tempted to switch carriers with better value-added service offerings. The switching group tends to change current operators more easily if the quality of the service no longer meets its expectations. In addition, subscribers in the switching group are ready to change again if they find lower prices through promotions or special offers.

10. Conclusion and future Studies

When the process is well implemented, portability is a windfall to consumers who can switch operators without risking losing contact with their network.

From this observation, our study focused on subscriber behavior and perceptions of change after the introduction of the MNP.

The results show that the MNP doesn't contribute significantly to the national regulator objectives of breaking down switching barriers, the main idea that prevailed in subscriber perception.

This measure has indirectly improved switching barriers, through the subscriber lockout strategy and tactics.

Since the introduction of MNP in Morocco, increased competition and large-scale advertising campaigns have been observed. The goal is to retain existing customers and attract those of rivals, through several attractive offers.

On the regulatory side, and in order to develop a competitive economic policy, the application of the MNP as well as the awareness-raising of consumers, are recommended.

In addition, after the enforcement of MNP, the assessment of its effect on various levels (market, industry and consumers) should be done periodically and systematically. Actions to compensate for market failures are very useful and productive, although the regulator may not have all the information on social and market conditions. On the other hand, regulatory balancing needs to be viewed critically and comprehensively to ensure the achievement of government objectives.

This study proposes two practical implications to the Moroccan mobile regulator regarding prevalent switching barrier.

First of all, it is essential to establish an effective process for evaluating and developing technology. it's a powerful technique for an organization in examine new ideas, identifying and analyze causes or potential change, develop and plan possible solutions and finally select and implement the proposal technology. Technology Evaluation is a class of policy studies, which systematically examine the effects on society that may occur when a technology is introduced, extended or modified. It emphasizes those consequences that are unintended, indirect or delayed. Such an arrangement would help reduce the uncertainty costs associated with switching.

Then, a regulatory authority should force service providers to establish an easy and simple switching system (Lee & al., 2001)[14]. These are arrangements that can reduce search and evaluation costs before switching, as well as installation costs. The regulator may require

operators to share a common billing system, thereby meeting the needs of simplicity of the system. With this implementation, subscribers who wish to terminate their subscription in favor of another may easily pay the remaining charges through a common invoice. This latter disposition would also reduce installation costs.

Finally, this study has practical suggestions to make to mobile carriers. First, mobile carriers have to strategize and prepare themselves to gain the most from MNP. In a situation of healthy competition, Healthy competition involves everyone building up our own position; it is beneficial if it gives rise to more innovation and more solutions to offer, as well as competitive prices. This will engender subsequently a greater consumer interest, resulting in revenue growth. Second, traffic and service quality, brand power and ownership had been considered as mobile service's competitive factors before MNP. After its launch it seems that the development of new services and customer management are much more important. Good customer management enables companies to ensure the services they provide are inline with what the customer wants. Thus, operators are forced to change their marketing strategies that put their own numbers in vogue, by other strategies compatible with the specificity of the MNP. Third, the results of this study indicate that subscribers do not see customer service much differently. All the more so with regard to the customer service, call quality is not a significant factor. With the advancement of network technologies, calling qualities generally reach a high level. All else being equal, good quality customer service gives the edge over competitors. It is these two areas (customer service and network quality) that mobile operators have focused on securing their competitive edges. As a result, mobile operators are being asked to focus on other areas such as developing new applications.

As this study focuses only on subscriber MNP issues (how to ensure that customer rights are respected and how to prevent operators from rigging or clogging the system), future studies could deepen various aspects of MNP, such as technological aspects.

Future research areas could also concern the level of regret after the switching decision. The academic feasibility of this future direction of research can be facilitated by the application of the theoretical framework of cognitive dissonance.

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