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Original scientific paper

CONSUMER'S "LOCK-IN" – A KEY ELEMENT OF THE SWITCHING COSTS IN MOBILE TELEPHONY IN THE REPUBLIC OF MACEDONIA

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A b s t r a c t: This paper presents the calculation of the switching costs based on the previously developed model providing analysis for the mobile telephony market in the Republic of Macedonia for period from 2005 to 2015. Based on an administered questionnaire to various customers of the mobile telecommunication industry in the country, we find that the so called "Lock-in" affects the switching costs, being in close relation to the market competition. The analysis shows different stages of the competition on the mobile market and proposes some appropriate regulatory tasks.

Key words: switching costs empirical model; regulation; consumer behavior; loyalty; competition

„ЗАКЛУЧУВАЊЕ" ОД КОРИСНИЦИТЕ – КЛУЧЕН ЕЛЕМЕНТ ВО ТРОШОЦИТЕ ЗА ПРОМЕНА НА МОБИЛЕН ОПЕРАТОР ВО РЕПУБЛИКА МАКЕДОНИЈА

А п с т р а к т: Во овој труд се презентира претходно развиен модел за пресметка на трошоците за промена на оператор, надграден со анализа на пазарот за мобилна телефонија во Република Македонија во периодот од 2005 до 2015 година. Врз основа на прашалник што беше дистрибуиран до различни корисници на мобилните комуникациски услуги во државата, констатиравме дека таканаречените „заклучување" на корисниците влијае врз трошоците за промена на оператор, што пак е во тесна релација со конкуренцијата на пазарот. Анализата ги покажува различните нивоа на конкуренцијата на пазарот на мобилни комуникации, при што се предлагаат и соодветни регулаторни активности.

Клучни зборови: трошоци за промена на оператор; емпириски модел; регулатива; однесување на корисниците; верност; конкуренција

1. INTRODUCTION

Consumers on many markets for particular products or services face significant costs when moving to the product or service offered by a competing company. The most general feature related to the products or services offered on particular market is the so called consumer's *"Lock-in"*, which occurs when the consumer continues to use the product or service of a certain brand even when the same product or service offered by a competitive brand is cheaper [1]. An important benefit of "Lock-in" the consumer is that the companies are allowed to charge the prices above the marginal costs. A basic way to "Lock-in" the consumer is through the switching costs expressed in the form of human and physical capital that each customer invests to purchase a certain brand. It is necessary to highlight the fact that each brand operates on a standard that may not be compatible with the standards embedded among the competing brands.

This paper relies on the empirical research developed by Shy [2] that offers a model to precisely calculate the *switching costs* through the

observed prices and market share. Even there are vast of theoretical works in different industries related to this problem [3], empirical works are difficult to find. The empirical model is presented in Section 2. It is then tested with the actual data for the mobile market in the Republic of Macedonia for the period 2005–2015, when different stages on the market can be easily recognized. Section 3 presents the results and provides the appropriate discussion. Finally, section 4 examines the calculated switching costs based on the customer behavior with respect to "Lock-in" and provides some appropriate recommendations for activities in the future. Section 5 concludes the paper on how consumers can benefit from the competition.

The goal of the work is not only to calculate the consumers' switching costs for the existing mobile operators on the market in different stages of market development, but also to identify the rational behind the numerical values and the particular calculated switching costs. Also, the work locates some switching barriers and proposes appropriate regulatory activities.

2. EMPIRICAL MODEL

Direct measurement of the switching costs is a complex procedure. The implemented *Shy's model* offers a *"quick and easy" methodology* for estimation based on the observed variables [2]. His innovative approach allows the calculations of the switching cost without using any econometrics. The methodology enables calculation solely as a function of the prices / fees and market share. The methodology assumes that the companies involved in the price competition recognize the switching cost for the consumers and therefore maximize their prices. These prices are subject to the restriction that no other company will decide it is profitable to lower its prices in order to subsidize the switching cost of its consumers. Thus, the switching cost specific for that brand is calculated as a function of the observed prices and market share.

The model starts with the assumption that the prices of each company satisfy the Undercut-proof Property [2], so no company can increase its revenues by undercutting the rival company and no company can increase its price without being profitably undercut by the competing company. This model was adjusted to different developing phases, specifics and parameters of the mobile telephony market in the Republic of Macedonia and was validated through calculation of the switching costs based on real data, leading to relevant conclusions.

If we define S_i to be a switching cost of a i-company consumer and assume that all S_i (I = 1,..., I) are known to all companies and consumers, then each company $i \neq I$ takes the price charged by i-company p_I as known and sets maximal p_i to satisfy

$$\pi_1 = p_1 N_I \geq (p_i - S_i)(N_i + N_I), \quad (1)$$

where:

π_i stands for the revenues of i-company,

π_I stands for the revenues of I-company,

S_i is a cost of i-company's customer to switch into I-company,

p_i is a price charged by i-company,

p_I is a price charged by I-company,

N_i denotes the number of i-company's customers,

N_I denotes the number of I-company's customers.

Therefore, every i-company maximizes its price p_i so that I-company will not find undercutting as profitable. Because all prices are observed, unobserved switching costs of the consumers of each company can be calculated. By solving (1) as equality, S_i becomes

$$S_i = p_i - N_I p_I / (N_i + N_I),\ I \in \{1,\ldots, I-1\}. \quad (2)$$

Equation (2) represents the switching cost for i-company's consumers as a function of the prices set by i-company and I-company and the size of the market share of each company. This determines the switching costs of I-company's consumers. The company with the lowest market share (the I-company) assumes that it is the target of company 1, who first appeared on the market. Therefore, the I-company sets the price p_I that would make undercutting its price by company 1 unprofitable:

$$\pi_1 = p_1 N_1 \geq (p_I - S_I)(N_1 + N_I). \quad (3)$$

Since the price p_I is observed, the unobserved switching cost S_I is calculated from (3) in the case of equality as:

$$S_I = p_I - N_1 p_1 / (N_1 + N_1). \quad (4)$$

However, in reality consumers may not have the same switching costs. If the switching costs reflex the training or learning by doing, then the switching costs will be higher for those customers who have high *value of time* (they use the same brand for longer time), probably as result of higher income.

3. FITTING THE MODEL INTO ACTUAL MARKET CONDITION

In this section we use the model presented in the previous section to calculate the switching costs for the mobile telephony market in the Republic of Macedonia. The calculations reflex different phases on the mobile telephony market during a decade. Only the market shares of the mobile operators existing on the market in the specific period are used for the calculation. Particularly, the calculations use as input data the market shares in subscriber number and revenues.

3.1. *The period of monopoly*

Mobile telephony as a service in the Republic of Macedonia was offered in September 1996 by organizational unit "Center for mobile telephony" which functioned within the Public Enterprise "PTT Macedonia". After the separation of the postal activities from the telegraph and telecommunications, within the JSC (Joint Stock Company) owned by the state, it started to prepare for privatization named "Makedonski telekomunikacii". On January 15, 2000, the Government of the Republic of Macedonia and the consortium led by the Hungarian telecommunication operator "MATAV" signed a contract for sale of shares of JSC "Makedonski telekomunikacii", making "MATAV" in the register of shareholders of JSC"Makedonski telekomunikacii" as the owner of 51% of the shares. Today "MATAV" is Magyar Telekom Group and is a part of the international Deutsche Telekom.

The mobile activity center of JSC "Makedonski telekomunikacii" was transferred to JSC "Mobimak" on June 4, 2001. The new company provided only mobile telephony services and data transmission over a cellular communication network, based on signed concession agreement. In 2006, JSC "Mobimak" rebranded into "T-Mobile Macedonia" and became part of the international group "T-Mobile".

3.2. *Entry of a second mobile operator*

The period of monopoly was terminated on November 22, 2001, when the Minister of Transport and Communications of the Republic of Macedonia grant a concession for the provision of public mobile telecommunications services and networks to "MTS" Mobile Telecommunications Services Inc., which was wholly owned by the Greek Telecommunications Company SA "OTE".

The commercial launch of the mobile services was in June 2003 under the brand "Cosmofon". In April 2009 the Greek Telecommunications Company SA "OTE" totally sold the company in Macedonia to Slovenian telecommunications company "Telekom Slovenia", which continued to provide mobile communications networks and services. Since November 11, 2009, the company started to provide also fixed telephony services and digital broadcasting DVB-T on under the brand "ONE".

Switching costs in a period of duopoly. The presented empirical model in section 2 is used to calculate the switching costs for each of the two mobile operators "Mobimak" and "Cosmofon". Table 1 presents the calculated results based on the Cullen International Report 2 – Country Comparative Report "Supply of services in monitoring of South East Europe – telecommunications services sector and related aspects", June 26, 2006 [4]. It was used to observe the market share (by subscriber data base – where N stands for number of subscribers) and the revenues π (in Euros) of each company existing on the market. The calculated price p set by each company and the switching cost S are presented in euros.

Table 1

Status on mobile market (31. 12. 2005)

	N	π (€)	p (€)	S (€)
"Mobimak"	877,142	70,443,528.45	80.31	64.45
"Cosmofon"	384,186	20,007,406.50	52.07	–3.77

The estimated switching costs for the operator "Mobimak" consumers are higher than the switching costs for the operator "Cosmofon" consumers, since the former already uses network effects of its realized subscriber pool in contrast to the latter, as presented in Figure 1.

In order to check the validity of the estimated switching costs, it is necessary to identify the costs a subscriber faces when he/she replaces operator "Mobimak" with operator "Cosmofon" and vice versa. In the observed period, the subscriber had the following costs:

- costs in the amount of one-time fee for service usage and
- costs because of his lost time due to the change of subscriber's calling phone number.

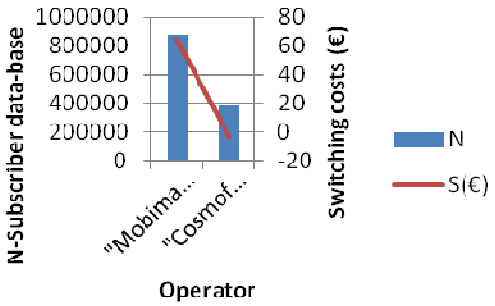

Fig. 1. Switching costs in period of duopoly

Given the pricelist of the operators, the calculated value of the switching costs are within the applicable prices and market conditions.

The negative value of the switching cost for the operator "Cosmofon" subscribers only confirms that in the observed period the number of the prepaid subscribers is dominant in the total number of the subscribers. It is a consequence of the operator's business model and policies and resulted in low costs for switching from this operator.

3.3. The third mobile operator

The use of radio frequencies for the third mobile operator in the Republic of Macedonia was published in October 2006 through. The Agency for Electronic Communications in March 2007 issued an approval to "Mobilkom Austria" for usage of radio frequencies for mobile telephony for a period of 10 years with a possible extension of the approval at least once for a period of 10 years. The third mobile operator in Macedonia began its commercial operation in September 2007 under the brand "VIP operator".

All three mobile operators began their commercial launch on the GSM (2G) technology platform. By decision of the Agency for Electronic Communications from 1.12.2013, all three mobile operators have gained approval for radio frequencies for LTE valid for 20 years and an obligation for commercial launch of 4G technology services within 9 months of authorization receipt.

Switching costs in the beginning of the work of the 3rd operator. The switching costs for each of the three mobile operators "T-Mobile", "ONE" and "VIP", only 3 months after the commercial launch of the third operator on the market and the relevant network parameters are presented in Table 2. The market share observations are based on source [5] from 31.12.2007. The price p set by each company and the switching cost S for the customers of each company, are calculated using the empirical model from section 2 and are presented in euros. The results show that the customers of each company have different values of switching costs when moving to other operator from the existing two companies.

Table 2

Status on mobile market (31.12.2007)

Operator	"T-Mobile"	"ONE"	"VIP"
N	1,212,610	592,970	141,136
π (€)	152,876,032.14	57,681,066.36	1.463,232.93
p (€)	126.00	97.27	10.36
S (€)	(T->V) 124.92	(O->V) 95.28	(V->T) –102.50
	(T->O) 94.05	(O->T) 12.65	(V->O) –68.20

It is obvious that immediately after the entry of a new operator on the market, the highest switching costs have subscribers who choose to exit operators "T-Mobile" and "Cosmofon" and switch to the new operator "VIP", as shown in Figure 2.

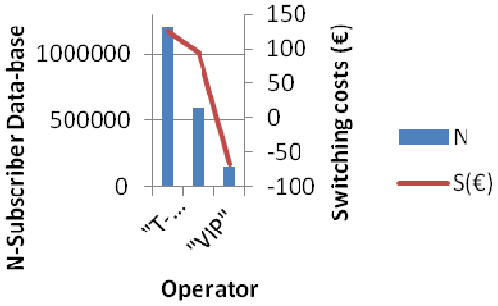

Fig. 2. Switching costs on the beginning of the work of the 3rd operator

This is confirmed by the results of the empirical model. So, the cost of switching the second operator appeared on the market (i.e. "Cosmofon") into the newest operator "VIP" are higher than the switching cost of the oldest operator "T-Mobile" This explicitly shows the impact of the network effect (the size of the subscriber base of the "T-Mobile").

In the period of observation, two older operators on the market have started to conclude subscriber agreements with their consumers. These agreements included subsidies for mobile handsets.

The amount of the calculated switching cost is increased compared to the one of 31.12.2005 due to the following costs:

- costs in the amount of one-time fee for service usage,
- costs because of lost time due to the change of subscriber's calling phone number, and
- costs because of the difference to the full value of the purchased mobile handset.

In the observed period, the "number portability", as a subscriber's right to keep the existing number when changing operator, has not been implemented, so we have considered the cost related to the time lost due to change of the subscriber number.

***Switching costs with 3 operators*.** The market parameters for three mobile operators "T-Mobile", "ONE" and "VIP" are shown in Table 3. The analysis was based on the observations of the market share and relevant data from Report 3 – Enlargement Countries Monitoring Report: „Supply of services in monitoring Regulatory and Market developments for electronic communications and information society services in Enlargement countries", from April 2013 [6].

Table 3

Status on mobile market (31.12.2011)

Operator	"T-Mobile"	"ONE"	"VIP"
N	1,151,761	494,877	566,585
π (€)	143,941,153.97	34,655,651.76	34,145,071.25
p (€)	124.90	70.00	60.26
S (€)	(T->V) 96.90	(O->V) 37.84	(V->T) –58.78
	(T->O) 103,90	(O->T) –17.36	(V->O) 27.63

Four years after the entrance on the market of the third operator for mobile communication services in the country, a decrease in the switching cost is noticed for the subscribers of all three existing mobile operators, as presented in Figure 3.

A strong impact of the network effect on the switching costs is obvious. Namely, with increasing of the subscriber base of the operator "VIP" closer to the number of subscribers of the operator "ONE", the costs for "T-Mobile" subscriber (when switching into one of two other operators) are almost equal. Switching costs for the subscribers of the oldest operator on the market of mobile communications, "T-Mobile", remain the highest due to the impact of the network effect.

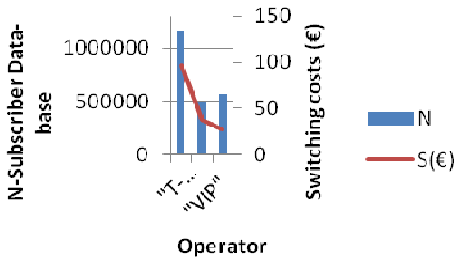

Fig. 3. Switching costs on market with 3 operators

In general, subscribers are faced with the following costs:

- costs in the amount of one-time fee for services usage;
- costs in the amount of one-time fee for service "number portability";
- costs because of the difference to the full value of the purchased mobile handset, and
- costs due to early termination of a subscriber agreement.

In the observed period, the operators in the country begun the procedure named "Lock-in" for their subscribers, by offering *loyalty contract* with duration of two or three years in return to favorable offer of service packages (benefits with included call minutes, SMSs and volume of internet traffic into the monthly subscription) and favorable offers for mobile handsets. The "number portability" starts from 1.9.2008, as a subscriber's right to retain the existing number when changing the operator. The Agency for Electronic Communications, with its decision from June 2009, calculates the amount of one-time fee for number portability as 200.00 denars (3.25 euros, excluding VAT).

3.4. *Market's developments in 2015*

The shareholders of the companies "Makedonski telekom" and "T-Mobile" have agreed to merge "T-Mobile" with "Makedonski telekom" on their meeting in June 2015. So, starting July 1st, 2015, "Makedonski telekom" and "T-mobile" bacame officially one company called "Makedonski Telekom" AD, which also provides mobile communication services.

The group "Telekom Austria" - owner of the "VIP operator" and the group "Telekom Slovenia" – owner of the operator "ONE" concluded an agreement to merge their daughter companies in October 2014. According to that agreement, the group "Telekom Austria" has 55% share capital and control over a newly created company, while the group "Telekom Slovenia" has 45% of the stakes. The newly created company called "one.Vip" has started October 1st, 2015, providing mobile communications services in the country, as a legal successor of the operators "ONE" and "VIP".

Table 4

Status on mobile market (31.12.2015)

	N	π (€)	*P* (€)	*S* (€)
Makedonski telekom	1,001,578	46,291,596.00	46.22	13.88
one.Vip	1,082,005	67,403,023.00	62.29	40.07

At the end of 2015, only two mobile operators, "Macedonian Telecom" and "one.Vip", were on the market. Table 4 presents the relevant market parameters based on the "Annual report for market developments in the Republic of Macedonia in 2015" [7].

After the merging, the new mobile operator "one.Vip" continued to supply the same packages and services that the both operators offered before the merging. This had an effect of doubled offers. The calculated results show the true effect of customer's "Lock-in" through loyalty agreements with duration of one or two years in return to the favorable offer for the service packages (benefits in included call minutes, SMSs and volume of Internet traffic into the monthly subscription) and for the mobile handsets.

The fact that even after the merging, the operator "one.Vip" impacts the market (as two separate operators versus its competitive operator), reflects in significantly higher switching costs with relatively small differences in the subscriber base. Therefore, the merging of the operators has a negative effect on the development and encouragement of the competition. From regulatory aspect, the case is trivial since it is step back instead of step forward.

3.5. *Analysis of switching costs for "T-Mobile"*

Since mobile operator "T-Mobile" is present on Macedonian mobile market for almost 20 years, it is interesting to analyze the behaviour of the switching costs for its subscribers in relation to its subscriber data-base over the studied period. The trends are shown in Figure 4.

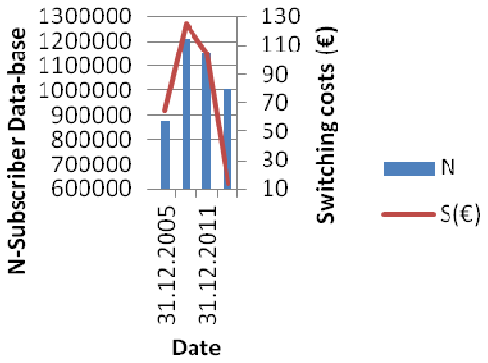

Fig. 4. Subscriber data-base vs. switching costs for "T-Mobile"

The graph shows that the network effect has a great influence over the switching costs for consumers of "T-Mobile". Also, the graph clearly presents a distinction between those costs which may arise from legitimate commercial customer retention strategies (period 2005–2014) and those that may arise due to the market failure, as it happened in the middle of 2015.

4. SWITCHING COSTS AND CUSTOMER'S "LOCK-IN"

The presented market characteristics and performed calculations for realistic scenarious defines the dependances and results for the switching trends and barriers. The following subsections provide some resulats and conclussions.

4.1. *Materials and methods*

We have used a survey with a structured questionnaire to test the relation between the switching costs and the customer's "Lock-in". Customers of all three mobile operators were sampled for the study. The study was performed during the distortion market period. The implemented research instrument was a *structured questionnaire.* The design of the questionnaire benefited from the

extant literature dealing with the effects of *switching costs* and *barrier on consumer retention* [8].

The research instrument attempted to isolate and emphases on consumer satisfaction and retention, as well as on switching barriers. The study has used a 5-points Likert's scale [9] ranging from "strongly agree" to "strongly disagree". The questionnaire was divided into three main sections. The first section dealt with the general demographic data, the second with the consumer behavior and satisfaction and the third section with the switching of an operator. The received data were analyzed using the SPSS (Statistical Package for the Social Sciences) computer package [10].

4.2. *Results and discussion*

The demographic data through the distribution of the respondents' age, sex and the number of members in the household are presented onTable 5.

Table 5

Demographic data

	Frequency	Percent (%)
Gender		
Male	23	38,3
Female	37	61.7
Age group (years)		
< 20	0	0.0
21 – 30	12	20.0
31 – 45	28	46.7
45 – 60	18	30.0
> 60	2	3.3
No. of members in the household		
1	1	1.7
2 – 4	54	90.0
> 4	5	8.3

The study uses a *convenient sample,* which has a total of 60 subjects (23 male and 37 female). All respondents were aged from 21 to over 60 years (mostly covered respondents are in the category of 31 to 45 years). Even though it is not a part of the goals of this research, it can be concluded that all of them belong to the working population with regular sources of income. The sample includes respondents with secondary (4 cases) and higher education (56 respondents). Most of them work in private companies (44 respondents). Also, the survey includes respondents who work in different sectors (economy, health and education). According to the amount of the total household income, most of the respondents are in the category with turnover over 60,000.00 denars (27 respondents). Most of the respondents live in households with 2 to 4 members (54). Only 5 respondents live in family households where there are more than 4 members, while 1 respondent lives alone or in a household of 1 member.

All respondents use mobile communication services of all three mobile operators more than three years: 30% of the respondents are operator "ONE" consumers, 50% of the respondents are operator "T-Mobile" consumers and 20% of the respondents are operator "VIP" consumers.

The questionnaire analysis leads to some conclusions and observations:

- The number of post-paid customers prevail the number of pre-paid consumers (ratio 95:5 (%)), which also confirms the effect of customer's "Lock-in" since operators use loyalty agreements with duration of 1 or 2 years in return for favorable offer of service packages (benefits in included call minutes, included SMSs and included volume of Internet traffic into the monthly subscription) and favorable offers for products, such as mobile handsets, TV-sets, IT equipment, etc.
- Mobile communication services are used more for business (66.66% of the respondents) than for private purposes (31.67% of the respondents), which is in line with the dominance of post-paid customers related to the prepaid ones.
- Number of consumers of all three mobile operators who didn't switch their operator in the last two years is higher than the ones who did switched their mobile operator in the last two years. The ratio of frequencies of not switched compared to frequencies of did switched is 41:18.
- The largest number of respondents who answered negatively the question: "Have you tried to change your mobile operator in the last two years?" use mobile communication services of the same mobile operator as the members of their family. Consumers respond

positively to their mobile operator with a recommendation the same mobile operator to the members of their family, and thus potentially, increase the number of users of that mobile operator.

- The reasons for not switching the mobile operator vary and depend on the customer preferences. Table 6 shows the received answers on the question: "What was the main reason not to change mobile operator?"

Table 6

Responses on the question: "What was the main reason not to change mobile operator?"

Answer	Percent (%)
Subscriber agreement does not allow to switch the operator	7.5
The current operator has the best offer	42.5
Switching doesn't mean big benefit	20
Switching costs are too high	5
Hard to decide which operator is the cheapest	2.5
Other	22.5

Users do not change the operator of mobile communication services when they are satisfied with the offer of the current operator, as most of the participants answered, and when they have signed a subscriber agreement with mandatory duration with the current operator. Also, a significant number of the respondents believe that the benefits that they would have with the operator change is insignificant, pointing to the fact that operators use similar strategies in attracting and retaining the customers. Satisfied users return to their operator by re-selection of the same operator. Also, users shall respond positively to the mobile operator with their recommendation the same mobile operator to the members of their family, friends and relatives, and thus potentially increase the number of users of that mobile operator.

However, a valuable percent (5%) of the received answers is from the respondents who answered that they didn't changed their mobile operator because of the switching costs and because activities for changing the mobile operator are too long and complex. This should be a sign for the regulatory body in the country to take appropriate activities in a direction of revision of the current procedures for operator switching. Often, it is a regulation for number portability, as well as regulation for end users rights protection and analysis and regulation for operator offers and prices on retail level. The focus should be on a duration of a procedure for number portability and in minimization of any barriers into subscribers' agreements that affect the user's right to switch the operator: determining the maximum duration of the mandatory period of duration for the subscriber contract, elimination the possibilities for automatic extension into a new commitment period after the expiration of the subscriber contract with mandatory duration, educating consumers about their rights.

The major contribution of this analysis is the conclusion related to the existence/absence of the possibility to switch the mobile operator for all customers on their free will. The switching costs have negative impact on customer's decision to switch the mobile provider. However, the customer's data base – network effect – has positive effects on the customer retention.

5. CONCLUSIONS

The level and complexity of changing the provider is a key indicator for the welfare and prosperity of customers and it is a significant factor influencing the overall development of competition on the retail markets [11]. The ability and the willingness of the consumers to switch the service provider is critically important because effective competition provides increased choice and lower prices for consumers, as well as adequate quality and innovation.

The paper shows the relation between the level of the competition and the switching costs on the mobile market in the country within the period of 10 years. Also, it stresses some weak points in the switching procedures and suggests appropriate regulatory activities in the near future. The presented analysis was based on analytical model and survey, which tests the results of the model.

To benefit from the competition, the consumers must be confident that they have a choice and that they can benefit from that choice. In cases where there is no such confidence, consumer may decide not to switch the provider. The reduction of the consumer's confidence in the switching procedure may additionally block the switching decision. This can weaken the process of the competition and consumers can not benefit from the competition as expected.

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