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ПУТИ ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ТЕЛЕКОММУНИКАЦИОННОГО СЕКТОРА: ПРИМЕР АРМЕНИИ

Аннотация. Как во всем мире, так и в Армении рынок телекоммуникаций насыщен. Чтобы понять роль услуг, предлагаемых операторами связи, определить доступность инновационных технологий и выявить проблемы, возникающие у абонентов, мы провели анонимный социологический опрос среди населения Армении а также разработали систему, состоящую из нескольких показателей для измерения эффективности сектора. Результаты социологического опроса еще раз доказывают, что инновации и новые технологии обеспечивают лояльность клиентов. Из ответов можно сделать вывод, что реформы, проведенные в разные годы: расширение сети, импорт новых технологий и их внедрение способствуют формированию лояльных клиентов. Для измерения эффективности сектора была измерена эластичность различных показателей по отношению друг к другу. В результате наиболее эластичным из этих показателей считается эластичность реального импорта инновационного оборудования по отношению к реальной выручке, что означает, что импорт оборудования чувствителен к снижению выручки. Полученные результаты свидетельствуют о том, что сектор находится в достаточно высокой степени насыщения, дальнейший рост абонентов сопровождается снижением выручки, поскольку их привлечение в основном происходит в случае снижения цен на предоставляемые услуги. И единственный способ быть конкурентоспособным - предоставлять новые услуги за счет импорта инновационного оборудования, особенно предлагая интернет-услуги потребителям по доступным ценам, благодаря повышению их лояльности.

Ключевые слова: инновации, эффективность, телекоммуникации, эластичность, конкурентоспособность, инновационное оборудование

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WAYS TO IMPROVE THE EFFICIENCY OF TELECOMMUNICATIONS SECTORS: THE EXAMPLE OF ARMENIA

Abstract. Both worldwide and in Armenia, the telecommunications market is saturated. In order

to understand the role of services offered by telecom operators, determine the availability of innovative technologies and identify problems that arise among subscribers, we conducted an anonymous sociological survey among the population of Armenia and also developed a system consisting of several indicators to measure the effectiveness of the sector. The results of the sociological survey prove once again that innovations and new technologies ensure customer loyalty. From the answers, it can be concluded that the reforms carried out in different years: the expansion of the network, the import of new technologies and their implementation contribute to the formation of loyal customers. To measure the effectiveness of the sector, the elasticity of various indicators in relation to each other was measured. As a result, the elasticity of real imports of innovative equipment in relation to real revenue is considered the most elastic of these indicators, which means that equipment imports are sensitive to a decrease in revenue. The results obtained indicate that the sector is in a fairly high degree of saturation, further growth of subscribers is accompanied by a decrease in revenue, since their attraction mainly occurs in the case of lower prices for the services provided. And the only way to be competitive is to provide new services by importing innovative equipment, especially by offering Internet services to consumers at affordable prices, thanks to increasing their loyalty.

Keywords: innovation, efficiency, telecommunications, elasticity, competitiveness, innovative

Introduction: Since the 80s of the last century, reforms have been carried out in the telecommunications sector in both developing and developed countries. The liberalization of the telecommunications sector contributes significantly to economic growth through the development and dissemination of information and communication technologies (ICT) in the economy. The openness of the telecommunications market and the quality of regulatory regimes are the main driving forces for the development of the ICT sector (OECD 2000).[1]

However, in recent years, the growth rate of ICT use has been more modest in terms of indicators than in the first decade of 21st century. This is due to the fact that in many countries, especially in developed countries, penetration rates are approaching the saturation level, if not throughout the country, then at least in certain segments of the population.[2, p. 3]

The dynamic development of the telecommunications sector is also evidenced by the GSMA (Global Mobile System association) 2021 report. According to this report, by the end of 2020, the number of mobile subscribers in the world was 5.2 billion people, which is 67% of the world's population, mobile Internet is used by almost 50% of the world's population. The growth of new subscribers is becoming increasingly difficult, as the markets are more saturated, and the coverage of the rural population in difficult financial conditions in the telecom sector is more difficult from an economic point of view. Nevertheless, by 2025, almost half a billion new subscribers are expected, as a result of which the total number of subscribers will reach 5.7 billion (70% of the world population), and this number will be provided through the countries of Asia and Africa. In 2020, mobile technologies and services provided an income of 4.4 trillion dollars-5.1% of global GDP. It is expected that by 2025 it will reach \$ 5 trillion, which will be facilitated by the intensive use of innovative processes, which will lead to increased efficiency, due to the expansion of the use of mobile services. It is also expected that during that period 5G will benefit all the sectors of the global economy. [3, pp. 3,6]

In terms of the number of subscribers, the Armenian telecommunications market is also saturated, currently there is more and more competition in terms of providing new services and affordable prices, but in parallel with all this, telecoms continue to introduce new generation networks, new technologies to improve the quality of their services.

The purpose of the study is to find out the role of innovative technologies introduced in the telecommunications sector of Armenia in improving the competitiveness and efficiency of the sector. For that purpose, data analysis and an anonymous sociological survey among the population aged 16-70 have been carried out.

Literature review: The faster new technologies are being change and introduced, the more flexibly and rapidly the telecom organizations should react.

A. Lange-Keęczyńska believes that telecommunications organizations must have flexibility and the ability to react quickly in order to remain competitive in a market full of challenges, otherwise they will fail. Researches show that many operators are unable to respond quickly to rapidly chang-

ing market conditions because they still rely on manual processes, old systems and outdated IT infrastructures.[4]

In his research, Dachyar concluded that companies should develop new innovative strategies to improve the quality of services, which will help maintain the number of customers. Good innovations can constantly improve both the quality of service and the quality of products.[5, pp. 1-5] The introduction of innovations, new technologies are contributing to the improvement of the telecom sector efficiency and the increased level of competitiveness.

Bourreau M. and Doğan P. believe that the telecommunications sector is a dynamically developing sector. The dynamic sector is characterized by a high rate of innovation adoption. The competitiveness of the telecommunications sector is ensured by innovations in the following areas: innovations in the creation of new services and innovations aimed at creating alternative network infrastructures. Innovation in the creation of new services is mainly provided by the telecom operators, and equipment suppliers provide network technology innovations. Innovation in the equipment market is followed by their introduction in the telecommunications sector. Telecom operators should decide when to introduce a new technology and whether to implement it, since the rapid implementation of this process can be expensive and risky. [6, p. 4]

In recent years, mobile data transmission services, which are the basis of the mobile Internet, big data, cloud technologies and the Internet of Things, have become widespread. From the point of view of telecom operators, with the commercialization of 3G and 4G networks, mobile data transmission services have provided more revenue than traditional services (voice calls, SMS).[7, p 140]

Nevertheless, during this period of modernization of new generation networks, the impact of new services provided through mobile data transmission is still at the disclosure stage, since it is not yet fully applied.

In their research, Du, Y., Zhang et al. came to a conclusion that, despite the fact that new services are currently a priority for telecommunications operators, traditional services are necessary. Investments, network construction and user size are important factors influencing the introduction of new services, but in practice, the vast majority of telecom operators focus more on revenue and data transmission volume. At the preparatory stage of the introduction of new services, it is very important to maintain the number of subscribers. When the stage of competition comes, special attention should be paid to the quality of the network, which is the basis of the competitiveness of telecom operators. At the same time, the introduction of new services contributes to an increase in the needs of subscribers, therefore, it is also necessary to take into account the number of subscribers and the volume of further investments.[8]

In the framework of their 2017 study, Stork, C. and others analyzed the transition from voice services and messaging to OTT (over-the-top) services-using the Internet (WhatsApp, Skype, etc.) and the decline in revenue as a result. They have noted that one should not seek to regulate OTT services, instead promoting the transition of fixed entry prices.[9, p. 1]

In the study conducted by Chen, it becomes clear that every year the number of telecom operators achieving technical efficiency decreases, which shows the impact of Internet services (OTT). Telecom operators will continue to play an important role in providing broadband connection, developing networks and infrastructures, increasing their credibility and brand.[10, p. 1]

Various researches show that in a growing competitive environment, success is achieved by those organizations that pay attention to providing customers with not only basic services, but also provide additional value, and only effective innovations contribute to customer loyalty.[11]

Despite the fact that the telecommunications sector continues to develop, the erosion of revenue caused by OTT services continues, forcing organizations in the sphere to identify new ways to attract and retain subscribers. [12]

Considering the above and the trends in the development of the telecommunications sector in Armenia, we conducted an analysis by analyzing the coefficients of elasticity of revenue in the telecommunications sector for 2012-2029 period as well as a sociological survey.

Analysis. The research was based on the following data published by the Statistical Committee of the Republic of Armenia: revenue in telecommunications, annual growth rate, the number of active mobile subscribers and the number of subscribers with Internet access, as well as the real volumes of imports to Armenia published by the UN-innovative equipment, etc.

Based on the estimation of the impact of real imports of innovative technologies and non-innovative equipment on the real revenue of the telecommunications operators in Armenia from the second half of 2014 till the end of 2020, the research identified that the decrease of telecoms revenue leads to the growth of real imports of innovative technologies. [13, p. 72, 76]

In order to understand the role of services offered by telecom operators, to identify the availability of innovative technologies and identify problems raised by subscribers, we have conducted an anonymous sociological survey among the population of Armenia. The number of respondents- about 400, who took part in the survey makes it possible to ensure a 95% confidence level and a maximum 5% error probability.

The survey answer results prove once again that innovation and new technologies ensure the customer loyalty. When asked why they use the services of their operator, 34.5% of respondents answered for the good combination of quality and price, for 29.2% the availability of the network is essential, for 24% it is important to have flexible packages for home Internet, mobile communications and the OTT service. From the answers to this question, it can be concluded that the initiatives carried out in different years: the expansion of the network, the import of new technologies and their introduction contributes to the formation of loyal customers.

Another important result from the survey is related to the features of the telecom operators. When

	2012	2013	2014	2015	2016	2017	2018	2019
The real revenue of the sector (billion AMD)	165.21	163.23	152.30	119.55	113.69	114.60	111.28	106.27
The number of active mobile subscribers	3,322,800	3,346,300	3,459,100	3,464,500	3,434,600	3,488,500	3,579,300	3,618,700
The number of subscribers with Internet access-including through telephone	1,914,100	2,036,300	2,084,200	2,199,800	2,411,500	2,623,600	2,894,000	3,087,300
The real import of equipment (billion AMD)	18.56	13.28	12.63	10.43	21.13	13.45	20.71	16.11

From our side, a system was proposed consisting of several indicators for measuring or evaluating the effectiveness of the sector, which will allow over time to find out the relationship between real income, subscribers and the innovative equipment in an annual context.

From our side, the following performance indicators of the sector were proposed;

1. Industry turnover elasticity with respect to active mobile subscribers
2. Industry turnover elasticity with respect to the number of subscribers with internet access
3. The elasticity of real import of innovative equipment with respect to active mobile subscribers
4. The elasticity of real import of innovative equipment with respect to the number of subscribers with internet access
5. The elasticity of real import of innovative equipment with respect to the real revenue of the sector
6. Real import of innovative equipment-to-real revenue ratio
7. Real revenue of the sector per subscriber for active mobile subscribers
8. Real revenue of the sector per subscriber for Internet access subscribers.

The following method was used to calculate the elasticity coefficients. We took the log of variables of interest, then the subtracted the values of the previous year from the values of the given year and the differences obtained were divided into each other depending on the indicator. The coefficients of elasticity of the observed period became the averages of those years. Given the fact that real value of revenue in 2015 had a fairly large difference with 2014, it was considered an outlier, and the elasticity coefficients were calculated as an average of the coefficients of elasticities of the following years covering the periods: 2013-2014, and 2016-2019.

As a result, according to the elasticity indicators (Table 2), it is generally expected that within one year;

1. An increase in the number of active mobile subscribers by 1% may lead to a decrease in the real revenue by 0.475%.

2. An increase in the number of subscribers with internet access by 1% may lead to a decrease in the real revenue by 0.774%.

3. An increase in the number of active mobile subscribers by 1% may lead to a reduction in the volume of real imports of innovative equipment by 0.119 %.

4. An increase in the number of subscribers with Internet access by 1% may lead to a real reduction in the imports of innovative equipment by 0.123%.

5. The growth of real revenue by 1% may lead to a reduction in real imports of innovative equipment by 8.583%.

Calculated indicators	Coefficient
Industry turnover elasticity with respect to the number of active mobile subscribers	-0.475
Industry turnover elasticity with respect to the number of subscribers with internet access	-0.774
The elasticity of real import of innovative equipment with respect to active mobile subscribers	-0.119
The elasticity of real import of innovative equipment with respect to the number of subscribers with internet access	-0.123
The elasticity of real import of innovative equipment with respect to the real revenue of the sector	-8.583

The most elastic of these coefficients is considered to be the elasticity of real imports of innovative equipment with respect to real revenue, which means that the import of equipment is sensitive to a reduction in revenue (Table 2). Its reduction in large sizes leads to the fact that operators will increase the import of equipment in order to be competitive. With a decrease in revenue, the share of equipment imports in revenue increases (Table 3), and the average ratio of the observed period amounted to 12.8% , whereas in 2019 this ratio accounted for 18.6%. From the point of view of increasing revenue, it will be desirable for companies to mainly increase the number of Internet access subscribers, since the real revenue from the subscribers with internet access exceeds the real revenue of active mobile subscribers 1.45 times, amounting to 52,823 AMD.

Table 3

	2013	2014	2015	2016	2017	2018	2019	Average of the periods: 2013-2014, 2016-2019
Real import of innovative equipment / real revenue ratio	11.2%	8.1%	8.3%	8.7%	18.6%	11.7%	18.6%	12.8%
Real revenue of the sector per sub- scriber for active mobile subscribers	48,780	44,028	34,508	33,103	32,852	31,090	29,368	36,537
Real revenue of the sector per sub- subscriber for Internet access subscribers	80,161	73,072	54,347	47,147	43,682	38,452	34,422	52,823

The results obtained indicate that the sector is in a fairly high degree of saturation, further growth of subscribers is accompanied by a reduction in revenue, since their attraction mainly occurs in the case of a decrease in prices for the services provided. And the only way to be competitive is to provide new services through the import of innovative equipment, especially offering Internet services to consumers at affordable prices, thanks to an increase in their loyalty (as survey results suggest). By calculating these indicators, the government can periodically, once every 3-5 years, monitor the effectiveness of the sector and, as a result, develop appropriate measures or a strategy for the development of the sector, which will contribute to an increase in revenue.

Conclusions: Analyzing the presented data, the proposed coefficients and the sociological survey results, we come to the conclusion that the telecommunications sector of Armenia has also reached saturation, due to an increase in the number of subscribers, the profit of organizations does not increase. This can be explained by the fact that the OTT Internet services play a role in increasing the number of subscribers, as a result of which people use traditional services less - phone calls, messages, preferring new services based on the Internet. Nevertheless, telecommunications operators continue to introduce innovative technologies and equipment, since only through continuous improvement and dynamic development is it possible to maintain the number of subscribers, operators also import and

¹ It was calculated by the authors by making required computations on the data of Table 1.

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