Developing competition in the Ukrainian mobile communications market

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Abstract

Based on the study of the mobile market of Ukraine, the main elements of its structure and the degree of intensity of competition between the main actors have been determined. The necessity to take into account several factors that influence coordination capacity of the market and the conditions of collective dominance of the largest subjects of mobile services market have been outlined. The market concentration indicators and their characteristic tendencies have been analyzed, as well as the conditions and nature of the growth of the mobile market in Ukraine at the present stage. The study of the competitive environment has led to the conclusion about the oligopolistic structure of the Ukrainian mobile communications market with prominent leaders such as PJSC "Kyivstar", PJSC "VF Ukraine", LLC "Lifecell". The study results allow to characterize the Ukrainian mobile communications market as favorable for collusion between the largest operators.

Keywords: competition, market players, market coordination, market share.

Introduction

In the economic development process, the active use of telecommunications technologies, including mobile services, provides a transition to the information society where information becomes the most valuable economic resource. Therefore, the development of the mobile communications market today is a prerequisite for economic growth and one of the ways of achieving post-industrial societies level for transition economies. At the same time, communication media is becoming more accessible for people, and operators of various communication types have difficulties working in a highly competitive environment. The integration of Ukraine into the European Union with the prospect of expanding the digitization of the communication space, document circulation, storage and analysis of information (including through the use of artificial intelligence even in the media), wholesale and retail trade, etc, actualizes the study of the competition prospects in the mobile services market of Ukraine.

The features of competition development were analyzed in the works of many scientists, among them are Melnyk T., Kudyrko L., Samsonova L. (2019). Scientists have examined exogenous (related to the institutional environment of the host countries) and endogenous (areas of activity, corporate strategy, competencies and competitive advantages of companies) factors that allow

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multinational corporations (TNCs) to gain competitive advantages through the use of contractual relations through multilateral relations for determination of the nature of network structures, coordination and management mechanisms. Gerasymenko A., Borovyk I., Afendikova S. (2017), Houpis G., Rodriguez J. M., Serdarević G., Ovington T. (2016) are known for the successful study of the methodology of competition assessment. They drew attention to the formation of single wholesale mobile networks in individual countries, emphasizing that countries with network competition have a higher level of innovations than countries that have a single stable network. Umantsiv I., Sonko Y., Yatsyshyna K. (2019) have made a significant contribution to the study of the features of the competitive environment in the markets of individual goods and formulated recommendations in the field of market competition development and improving the competitiveness of products. Nwabueze U., Mileski J. (2018) identified the impact of modern information technologies on the performance of companies in a multicultural competitive global environment. Coibion O., Gorodnichenko Y., Ropele T. (2020) have developed a methodology to use a poll to examine the impact of inflation expectations on firms' prospective decisions, with the determination of relatively high inflation expectations contribute to higher prices and increased lending demand while reducing employment.

However, many problems of competition in the telecommunications markets remain unexplored. In particular, such issues include theoretical and methodological aspects of studying the level of competition in the mobile market of Ukraine as well as analyzing the prerequisites for anticompetitive concerted action by dominant players.

The present paper objective is a study and assessment of the level of competition in the mobile market in Ukraine based on an analysis of the main factors influencing the market structure.

Material and methods

The theoretical and methodological basis of the article is the reports of international agencies in the field of telecommunications as well as the scientific works of domestic and foreign economists on the problems of stimulating competition in the telecommunications markets. In the process of writing the article, several traditional and modern scientific methods and approaches of economic research have been used, such as statistical, empirical and comparative analysis, economic and mathematical. The last one was used to assess the level of concentration in the Ukrainian mobile communications market. The methods of analysis and synthesis are applied to clarify the economic content of competition; statistical - to determine the trends of the mobile market in Ukraine.

Results and discussion

The telecommunications market is one of the most dynamic segments of the communications industry. Mobile communication has become one of the most affordable services, and it is largely due to the lower cost of deploying and maintaining telecommunications networks, compared to fixed communications (Coibion O. et al, 2020). The main prerequisites for such a rapid development of mobile communications services are the restructuring of the telephone market in Ukraine; saturation of the telecommunications market with standard fixed line services; the need to develop telecommunications infrastructure; increasing consumer needs for communication services; dependence on the development of world telecommunications standards.

In Ukraine, the sphere of communication is developing at a rapid pace, which in recent years has been the highest in comparison with other sectors of the economy. Immediately after Ukraine gained independence, the telecommunications sector was represented by the only state operator Ukrtelecom, which provided fixed city, long-distance and international telecommunication services, compared to the current situation where 6 operators are providing mobile services in Ukraine according to the information of the National Commission for State Regulation in the Sphere of Communications and Informatization (Table 1).

In addition to the use of next-generation technologies, each operator now offers a variety of service packages to the standard suite of voice telephony, SMS, MMS and Internet access services, that includes many other services, enabling subscribers to expand the scope of mobile telecommunication services. ulcer. Such changes in the offers of Ukrainian operators point to the formation of a fundamentally new market, which approximates to the standards of the world telecommunication market (National Commission for State Regulation of Communications and Informatization, 2020).

Table 1. **Operators providing mobile services in Ukraine as of 01. 01. 2019**

Operator	Technologies
Kyivstar PJSC	GSM, UMTS , LTE
PJSC «VF Ukraine»	GSM, UMTS, LTE
Lifecell LLC	GSM, UMTS, LTE
TriMob LLC	UMTS
Intertelecom LLC	CDMA
PJSC “Telesystems of Ukraine” (PEOPLEnet)	CDMA

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

In telecommunication services revenue, mobile services accounted for 61.9% in 2018 (Figure 1). Such a large share of the income structure is due to the demand for mobile services among the population compared to other telecommunication services. In the structure of revenues from the provision of mobile services as of 2018, the largest shares are revenues from the provision of voice telephony services - 41.9% and access to the Internet - 45.8%, the total share of which is 87.7 % (State Statistics Service of Ukraine, 2020). Analyzing the period from 2010 to 2018, we can see the positive dynamics of revenues from the provision of mobile services (Fig. 2).

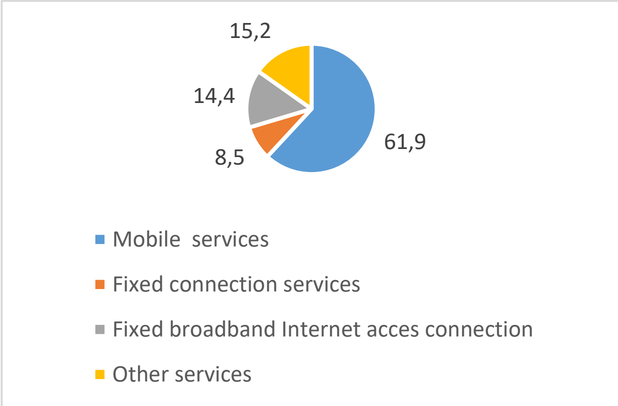

Fig. 1. Revenue structure of telecommunication services in Ukraine in 2018, %

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

In 2018, mobile services revenue was UAH 34,978 million, up 9 % from the previous year. However, the period from 2015 to 2016 was characterized by a fall in revenues, which was caused by political instability, hostilities in the east of the country, the annexation of the Crimea, the collapse of the network of some operators (National Commission for State Regulation of Communications and Informatization, 2020). To date, no Ukrainian operator operates in the Crimea, and in the territory of the temporarily occupied Donbass provides limited services only PJSC "VF Ukraine". The sharp drop in revenue from 2015 to 2016 is also associated with the development of the network and the introduction of the third generation (3G) technologies, which has led to a significant in the cost of mobile telephony tariffs against the background of low solvency of the population. However, the period from 2010 to 2018 is characterized by a positive trend in the growth of revenues from the provision of mobile services.

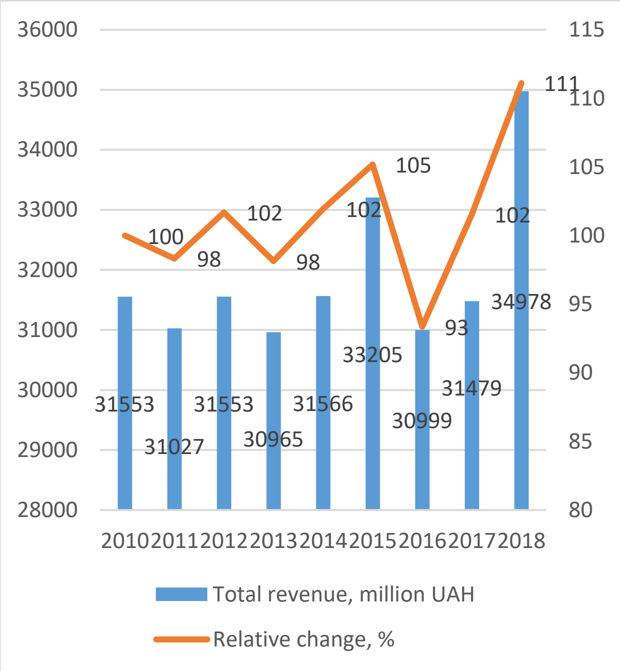

Fig. 2. Dynamics of revenues from rendering mobile services of Ukraine for 2010-2018, million UAH.

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

Concerning the dynamics of the number of subscribers, for the same period from 2010 to 2018 the subscriber base showed both positive and negative dynamics (Fig. 3). Equally important is the analysis of the dynamics of the number of subscribers, together with the indicator of mobile penetration. Mobile penetration is an indicator that reflects the saturation of the relevant market and the degree of availability of services and is calculated as the number of active (mobile) devices per 100 population. The decrease in penetration rates in 2018 is due to the introduction of fourth generation telecom operators, as not all phone devices support the use of this LTE (4G) technology, and to switch to using this service, a subscriber often needs to replace an existing mobile phone with a more modern smartphone with 4G support (Nwabueze U., Mileski J., 2018).

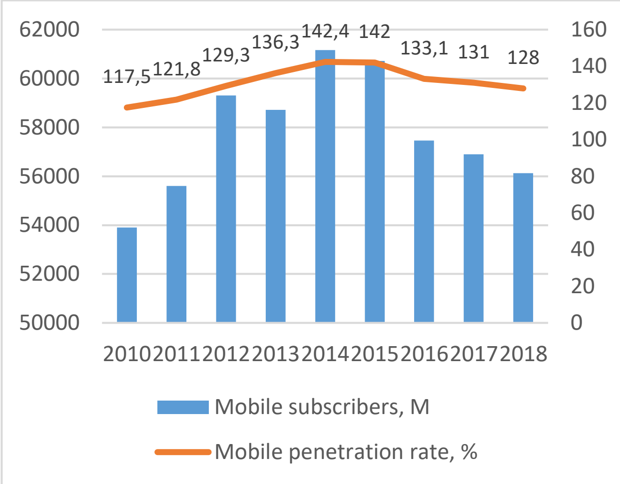

Fig. 3. The dynamics of mobile subscribers and the availability of mobile communications per 100 inhabitants in 2010-2018.

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

By analyzing both charts, we can conclude that in recent years the increase in revenues is not due to the increase in subscribers, but due to the increase in the duration of calls and the provision of additional services. In May 2019, the Mobile Subscriber Number Transfer (MNP) service was introduced in Ukraine, which is expected by many experts to revive competition in the market (Important Key Performance Indicators for Telecom Companies, 2020). Kyivstar mobile operator lost almost 6.8 thousand subscribers in three months of its number portability service. Its competitors the companies "VF Ukraine" and "Lifecell" have a smaller outflow of clients - 5.15 thousand and 2.9 thousand subscribers respectively (Fig. 4). Among operators, the largest number of subscribers went to VF Ukraine - 5.14 thousand people. A slight lag in Kyivstar with a figure of slightly more than 5 thousand. Next comes Lifecell - 4.5 thousand customers migrated to it (National Commission for State Regulation of Communications and Informatization, 2020).

Together with the analysis of trends in the development of the mobile services market, it is important to study the competitive environment that exists in this market. Indeed, the existence of equal conditions for business and the conscientious nature of the relations between the operators is the key to the effective functioning of not only the market of mobile services but also the economy of Ukraine as a whole National Commission for State Regulation of Communications and Informatization, 2020).

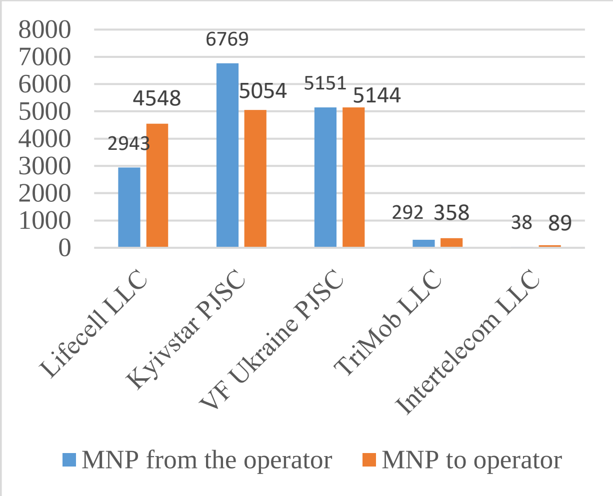

Fig. 4. Trends in the use of MNP service in Ukraine as of August 2019

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

One of the key tasks of assessing the level of competition in the market is to analyze its structure. The structure of the market is determined by the number of entities operating within the given market and the size of their market share (Table 2). Additionally, account should be taken of the nature of the interaction between market players, the presence of barriers to new players, and the ability of companies to influence the market. Therefore, the first stage of the analysis is to identify the main market players. As noted, six operators provide the main proposal in the mobile market.

Table 2. **Market shares of mobile operators of Ukraine in 2016-2018,%**

Operators	2016	2017	2018
Kyivstar PJSC	44	47,6	46,21
PJSC «VF Ukraine»	36	35,7	35,4
Lifecell LLC	16,9	13,8	13,95
TriMob LLC	0,7	0,6	1,57
Intertelecom LLC	2,3	1,8	2,44

Operators	2016	2017	2018
PJSC "Telesystems of Ukraine" (PEOPLEnet)	0,1	0,5	0,44

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

Available information on the market shares of the mobile operators can determine the degree of competitiveness of this market by using the concentration ratio CR and the market concentration index of Herfindahl-Hirschman Index (HHI) (Table 3). The market concentration ratio is calculated by the indicators of financial and economic activity of market entities having one of the five, four, three or two largest shares in the Ukrainian mobile communications market, and is determined by the formula:

$$CR = \sum_{i=1}^{k} Si \ ,$$ where

Si – market shares of a company i,

k – number of companies operating in the market.

The Index (HHI) is calculated by the market shares of all operators in a specific market of mobile communications services of Ukraine by the formula:

$$HHI = \sum_{i=1}^{k} Si^2 \ ,$$ where

Si^2 – the square of the share of a company i,

k – number of companies operating in the market.

The index can take values from 0 to 1. Moreover, a higher value of the index will mean a more concentrated market (hence, less competition and more risks for new players to enter the market) (Umantsiv I. et al, 2019). By default, the degree of market concentration can be determined from the results of the HHI calculation:

- the index has a value below 0.1 - insignificant market concentration;
- the index ranges from 0.1 to 0.2 - moderate market concentration;

- the index is above 0.2 - high market concentration.

Table 3. **Indicators of the market concentration of the Ukrainian mobile communications services market in 2016-2018**

Year	CR_1, %	CR_3, %	CR_5, %	NNI
2016	44	96,9	99,9	0,35234
2017	47,6	97,1	99,5	0,37345
2018	46,21	95,56	99,57	0,35917

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020)

During the analyzed period, the market remains highly concentrated, the Herfindahl-Hirschman Index (HHI), which is one of the main indicators of the status of economic competition in the market, ranges from 35234 to 35917. It should be noted that in the period from 2017 this indicator shows a tendency to decline, and gives grounds to argue for the intensification of competitive relations. At that time, the market concentration coefficients also show a decrease, for example, CR5 ranges from 99.9 to 99.57%.

To further explore the potential of the market structure, we calculate two more indicators of market concentration (Table 4). The first coefficient is the entropy of market shares, which is used to study the degree of competitiveness of the market structure and reflects the degree of disordered market structure, uncertainty and systematic distribution of market shares between market participants. The higher the entropy value, the lower the concentration of companies in the market and, accordingly, the lower their ability to influence the market price (Melnyk T. et al 2019).

Another indicator we have chosen to study the market structure is the Gini coefficient. It is usually defined mathematically based on the Lorenz curve, algebraically expressing the degree of uneven distribution of market shares. The resultant value of the Gini coefficient can range from 0 to 1. The zero value of the index indicates a uniform distribution of shares in the market while going to the unit - a high degree of uneven distribution of market shares and the possibility, respectively, of monopolization of the market.

Table 4. **Calculation of market share entropy and Gini index in 2016-2018**

Indicator	Indicator value		
	2016	2017	2018
The coefficient of market entropy	1,157	1,123	1,537
Gini coefficient	0,567	0,588	0,569

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020

The calculated indicator of market entropy ranges from 1,123 to 1,537, respectively, if the effective value of this indicator belongs to the interval from 0,5 to 2 - we are talking about an oligopolistic market whose monopolization is unlikely. As for the Gini Coefficient, its value is in the middle, but it goes more towards the unit, this tendency makes it possible to assume that there are prerequisites for collective dominance in the mobile market of Ukraine.

Equally important and expedient in the study of the competitive market environment is a dynamic assessment of the level of market concentration, namely the identification and analysis of barriers to entry (exit). Barriers to entry and exit are the most important characteristics of its structure. Due to such barriers, firms already operating in the market can not be afraid of competition. There are similar barriers to exit. If there are significant costs associated with exiting the market, the likelihood of entering a new player's market is low because the risk of future costs is too high (Lebedeva L. et al, 2019).

The presence of barriers to entry or exit combined with a high level of concentration enables firms to raise prices above marginal costs and to earn economic profit not only in the short but also in the long term, which determines the market power of these firms. Where barriers are absent or low, firms even at high concentration are forced to act competitively, taking into account the threat of potential competition in the way they would take into account the pressure of real competitors (Gurzhii T. et al., 2019). Thus, analyzing the current situation in the Ukrainian mobile services market, we can determine that the intentions of potential competitors to enter the mobile services market are limited, first of all, by the barriers that give decisive advantages to the actors in the market compared to new market entrants. Such barriers are, first of all:

- radio frequency resource limitations (in particular for the use of high bandwidth technologies), since the provision of mobile services, is only possible if access to radio frequencies is available;
- a significant contribution of financing for making investments in the creation of the network to ensure a sufficient level of coverage of mobile services of appropriate quality with further investment in the development and maintenance of the network;
- limited subscriber base, since the creation of a potential competitor of a new network, implies an outflow of subscribers from existing entities in the market;
- licensing of telecommunications activities, which imposes on the operator the obligation to fulfil and comply with some requirements for its activity;
- a limited number of resources, which according to Article 70 of the Law of Ukraine "On Telecommunications" is technologically limited state resource.

Thus, the above group of barriers is fundamental with the predominance of administrative barriers, so it can be assumed that any other additional barriers, which, in particular, could be created by operating entities, would have secondary importance as well as unlikely to have a significant impact on the pre-existing market situation.

The existence of prerequisites for collective domination in the market is negative when there is a likelihood that anti-competitive concerted actions will be taken by oligopolists. An additional method for predicting the likelihood of such a scenario is to evaluate the coordination capacity of the market (Table 5). Indicator of market coordination capacity determines the favourable conditions for the functioning of a market for the implementation of the strategy of conscious parallelism and, thus, its collective monopolization. The basis for evaluating this indicator was Thomas Schelling's focal point (or Schelling point) theory, with slight correction of the sources of coordination ability, given the complexity of calculating some indicators in practice and the specificity of the mobile service (Gerasymenko A. et al., 2017).

Therefore, the following indicators were selected to analyze the coordination capacity of the Ukrainian mobile services market: the degree of rigidity under the oligopoly; uniformity of goods (services); market transparency (ease and speed of dissemination of information on market conditions); stability of demand for the relevant product (service); the symmetry of the distribution of market shares between participants of the oligopoly nucleus; multi-market interaction of oligopolists; barriers to entry (exit from the market).

Market Coordination Indicator (B) is calculated as the sum of the productions of the partial coefficients of the consistency of competitive strategies by the weighting factor. Therefore, for the first source, we have specified the maximum coefficient that can be argued for the existence of a rigid oligopoly of the two largest operators Kyivstar and VF Ukraine. The rigidity of the oligopoly nucleus is determined based on Hasofer-Lind reliability index. Regarding the homogeneity of services, today companies offer quite differentiated service packages, which include all kinds of additional content offers, although interchangeability is to some extent present in the market in the form of standard packages of services (voice telephony, messages, access to the Internet) - so a partial coefficient for this source is 0.4 points.

Table 5. **Assessment of the coordination capacity of the Ukrainian mobile communications market**

Source of coordination ability	Partial Coherence Ratio of B*i* Competitive Strategies (0 to 1)	W*i* weight	Effective value
The degree of rigidity of the oligopoly	0,9	0,2	0,18
Uniformity of services	0,4	0,2	0,08
Market transparency	0,8	0,2	0,16
Market stability	0,8	0,1	0,08
Symmetry of the oligopoly nucleus	0,9	0,1	0,09
Multi-market interaction	0,5	0,1	0,05
Entry (exit) barriers	0,7	0,1	0,07
Indicator of market coordination capacity		**∑=1**	**0,71**

Calculated using: (Antimonopoly Committee of Ukraine, State Statistics Service of Ukraine, The official site of the PJSC «VF Vodafone, The official site of the LLC «Lifecell», 2020

The transparency of the mobile services market can be appreciated sufficiently, as pricing information is public and openly available, both at point of sale services and at corporate operators' sites. Also there is a tendency to use advertising tools with content information about discounts, etc.

Considering the dynamics of revenues from the provision of mobile services for the years 2008-2018, we can conclude that there is a slight fluctuation in the number of revenues, and therefore the stability of the market, which is favourable for predicting the future state of the market environment. The symmetry index (SI) of the oligopoly nucleus can be obtained using the Gini Coefficient, but only the largest players are taken into account. According to our calculations, this index is 0.1 and indicates a high uniformity in the distribution of market shares. The next multi-market interaction source was assigned a partial ratio of 0.5 as mobile operators interact in the market for network transit services and mobile telephony. As for the barriers to entry, as we have already analyzed above, the market is characterized by the presence of high barriers, and given the fact that they are objectively justified, the partial ratio is 0.7 points. Therefore, the effective value of the coordinating capacity is 0.71. Such an indicator demonstrates a favourable market environment for collusion between the largest market players.

Conclusions

1. An analysis of the national market for mobile communications services demonstrates its stability and potential for growth. At the time of writing, the change in ownership of Kyivstar PJSCs by Russian citizens did not affect the stability of the mobile communications market in Ukraine.

2. The study of the competitive environment has led to the conclusion about the oligopolistic structure of the Ukrainian mobile communications market with prominent leaders such as PJSC "Kyivstar", PJSC "VF Ukraine", LLC "Lifecell".

3. The analysis of market concentration indicators showed a downward trend during 2017–2018.

4. The assessment of the coordination capacity of the market gave reason to characterize the Ukrainian mobile communications market as favorable for collusion between the largest operators.

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