Impact of telecommunication technologies on the middle class formation

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Abstract. The article is devoted to the study of the impact of the information economy on the formation of the middle class. The paper identifies factors contributing to the increase in the share of the middle class in the transition to the information economy. The positive synergetic influence of telecommunication technologies on the formation of the middle class is considered through a possibility of using virtual spaces for labor and educational activities, a possibility of obtaining high returns in the form of dividends on intellectual capital, a qualitative change in the structure of needs, an access to new types of information services, etc. Authors develop a complex model of research of the middle class in the information economy, differing from those available using an expanded list of criteria. In addition to such widely used criteria as income level, level of education and self-identification, the criterion "degree of involvement in the information society" was introduced. The study substantiates that the transition to the information economy made an access to information and communication technologies one of the most significant criteria for social differentiation of society. On the basis of the model, an econometric estimate of the middle class has been carried out, which makes it possible to reveal the share of the middle class in modern society, dynamics of its development, as well as multicollinearity between spending on education, the Gini coefficient, access to information and telecommunication technologies and the size of the middle class.

Keywords: middle class, information economy, information society, social stratification

1. Introduction
Nowadays the formation of the middle class in Russia has become a priority task, which successful development largely determines the vector of the development of Russian society. The middle class, dominant in the social structure, is simultaneously proclaimed as the goal of economic reforms and as means of putting the state on a par with the developed European countries.

In the conditions of rapidly developing global information society, the middle class becomes the main initiator of innovative development of the economy. The availability and widespread use of information and communication technologies causes profound qualitative changes in it, contributes to

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the emergence of new forms of employment and income sources, facilitates access to education, which leads to active growth of the middle class. Changes in the essential characteristics of the middle class in the information society were first noticed by such Western scientists as M. Castells and R. Florida, who introduced the concepts of "creative class" [1] and "information producers" into scientific circulation [2]. The American researcher T. Malone introduced the term "e-lancer" (electronic freelancer) to refer to a new category of workers. [3] In the conditions of the development of the information society, the quality of life increasingly depends on the level of consumption of information products and services, the middle class, and especially its creative layer, becomes both a mass user and a producer of high-tech and innovative products [4].

In this regard, not only the study of the features and regularities of the formation of the middle class in different countries, but also the development of new criteria for the social stratification of modern society acquires particular urgency.

2. Materials and methods.

The study was based on the analysis of modern trends in the formation of the middle class, conducted using the statistical base and methodological tools of UNDP [5], the Federal Service for State Statistics of the Russian Federation [6], the Territorial Body of the Federal State Statistics Service for the Republic of Tatarstan [7], including the data of a one-time sample survey "Survey of the population of the Republic of Tatarstan for the purposes of monitoring the level and quality of life" (with the technical assistance of the World Bank) [8], studies on the middle class by NISP under the leadership of T.M. Maleva [9] and the IS RAS under the leadership of N.E. Tikhonova [10].

Also, there were analyzed the results from numerous remote employment surveys, including the Sologig.com Freelance Survey, USA (Harris Interactive Marketing Research Company, commissioned by the Sologig.com remote workstation, surveyed 2400 companies using freelancers, And 5,600 self-employed) [11]; Global Freelancer Survey of 2016 USA, 2016 FreelanceSwitch, the study covered 3,700 freelancers from different professions from six continents [12]; Data of the "All-Russian Census of Freelancers", conducted in 2014 with the support of the Higher School of Economics [13].

In the process of research, such general scientific methods as system analysis, spectral analysis, correlation-regression analysis, synthesis, and graphical method were used. Each of these methods was used adequately to its functional capabilities and resolving abilities for solving the relevant stage-by-stage research tasks.

3. Results

The science has no universally accepted and empirically valid structural model of the middle class, despite the extensive scientific literature that offers its definitions of the middle class and various criteria for estimating its size [14].

Numerous works determine the structure and size of the middle class with the use of a combination of three characteristics: material and property status, social and professional status and self-identification.

The explored stratification criteria have high consistency: people with higher education are engaged in highly skilled work, they are the most competitive, have a high income, which in the end generates a relatively high self-esteem.

With the transition to the information economy, new criteria for stratification appear: the amount and quality of knowledge and information, the ability to accumulate them and use them to generate income and education are considered as the resources that differentiate the society. In our opinion, the main indicators of the emergence of the middle class in the information economy are access to the widespread use of modern means of telecommunications for obtaining new sources of income and raising the level of education, the level of consumption of information products and services, and specific positions in the system of labor relations.
The use of indicators characterizing the involvement in the information society, in conjunction with generally accepted criteria for identifying the middle class, allows us to clarify its share in modern society and identify priority areas of public policy to increase its scale.

Considering the mentioned above, it can be concluded that in the conditions of the formation of the information economy, the scale of the middle class is derived from four main factors: income, education, self-identification and the degree of involvement in the information society.

Thus, the complex model of the middle class in the information economy can be represented in the following form:

\[ MC = f(P, E, S, ITT) \]  
(1),

where

- **MC** – middle class,
- **P** – income level,
- **E** – education level,
- **S** – self-identification,
- **ITT** – involvement in the information society.

The above criteria are not the same - in determining the middle class, some of them have a higher weight than others. The weight of these criteria depends on the level of the country's economic development. The transition to an information economy made access to information and communication technologies one of the most significant factors of social differentiation of society.

According to the methodology of the World Bank, one of the criteria for referring to the middle class is not income, but household expenditure [8].

Taking into account the methodology of the World Bank, the above model can be presented in the following form:

\[ MC = f(D, E, S, ITT) \]  
(2),

where

- **MC** – middle class,
- **D** – household expenditures,
- **E** – education level,
- **S** – self-identification,
- **ITT** – involvement in the information society.

Theoretically, the scales of the middle class calculated using these models should be the same, but in practice they are significantly different, since there is a significant gap between the level of expenditure and household incomes. The reason for the gap can be significant extent of the shadow (non-observed economy), as well as the growing scale of consumer lending. Hidden income is determined by the balance sheet as the difference between total expenditures for households, including the growth of their economic assets, and formally registered income.

The introduction of the indicator of expenditures of households to the model makes it possible to calculate the real scales of the middle class taking into account the hidden incomes. Unfortunately, many types of distance employment and other sources of income obtained using telecommunication technologies are still not reflected in official statistics. In this case, they are more often manifested in the indicators of household expenditure.

The most accessible for the study of the involvement of the Russian population in the information society are official statistics published by UNDP in the Human Development Report, where in assessing the availability of information and telecommunication technologies in individual countries, their ranking was carried out according to the following criteria: the population covered by mobile networks; Subscribers of broadband Internet access; Accessibility and cost of information and telecommunication technologies. The report presents data on 169 countries, so we have identified three groups of countries to simplify the analysis: with a very high level of human development, the USA (4th place), Germany (10th place) and Poland (41st place); With a high level of human development - Russia (65th place) and Ukraine (69th place), as well as the middle one - India (119th place).
As can be seen from the given data (Fig. 1), the population of Russia, which has access to all the services provided by information and telecommunication technologies, and primarily to the broadband Internet, is only 6.6%, while 13.3% of the population are owners of personal computers and have access to the Internet, and 31.9% of the population use Internet. In our opinion, 6.6% of the population able to make maximum use of information technology, both for professional activities and for meeting the need for information services, can be considered the share of the intellectual core in the middle class. This, in general, is close to the results obtained by T. Maleva, according to which the intellectual core of the middle class today is 5.3% of the population of Russia.

Figure 2. Correlation between expenditures of GDP on education, access to information and telecommunication technologies and the share of the middle class by countries (source: UNDP)
Analysis of personal computer availability, the availability of high-speed Internet per 100 people, as well as per capita GDP expenditure at various levels of education (Fig. 2) made it possible to reveal their positive correlation with the number of the middle class in the country. The higher the property stratification, the lower the availability of information and telecommunication technologies and education.

Studying the income differentiation using the Gini coefficient, on the contrary, the negative correlation is clearly seen. The results of the correlation analysis showed that there is a multicollinearity between the costs of education, the Gini coefficient, access to information and telecommunication technologies and the size of the middle class.

With the transition to an information society, an increasing influence on the formation of the middle class is provided by access to modern telecommunication technologies. The development of information and communication technologies and, above all, the Internet, has opened up new virtual spaces for labor activity, the formation of the Internet economy (e-economy), the corresponding electronic markets (e-markets, virtual markets) and e-business (e-business, e-commerce). The transition to the information economy has led to an active process of forming an elite middle class layer engaged in soft-tech and high-tech areas, in financial services, management, media, etc., characterized by a high standard of living based on the realization of their intellectual building.

The development of self-employment, the system of "information-based homework" makes it possible to get a job to a fairly large segment of the population, which for a number of reasons can not participate in traditional labor activity [15]. These are women with young children, disabled people, pensioners, who have limited mobility, but have a fairly large intellectual potential.

Information technologies have opened new opportunities for the development of new educational programs. In Europe, the spread of online learning is stimulated by the Bologna process and the Erasmus project, whereby students from different countries can participate in online seminars, learn any course of a foreign university via the Internet, and simultaneously study at several universities. The idea of developing a corporate system of distance learning is gaining more and more development. Up to 40% of large companies use online training technologies for retraining and upgrading their employees.

Factors contributing to the development of new forms of employment and changes in the system of labor relations of the middle class include: technological readiness at micro and macro levels, the development of financial markets and instruments, as well as the need for new services characteristic of the information economy.

4. Conclusion
The conducted researches have shown that formation of institutes of an information society and formation of an average class are closely interconnected. The growth of the share of the middle class in the structure of society leads to an increase in demand for institutions that ensure the transition to an information economy. This allows us to consider the middle class as a kind of resource for implementing the strategy of innovation and information development. The qualitative structure of the middle class, the nature and specificity of the groups existing in it, determine the possibilities of its influence on changes in the basic institutions of modern society.

The foregoing has led to the conclusion that the causal relationship within the triad "institutional environment" (a set of economic institutions) - the formation of the information economy - the formation of the middle class can have a direct character, when the change in the institutional environment follows the transition to an information society and the development of the middle class, And the reverse, when the growth of the scale of the middle class leads to a change in the institutional environment and acceleration of the transition to an information economy.
Thus, the conducted research allows to assert that involvement in the information society in the information economy becomes the most important criterion of social stratification of society.

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