

Factors Determining the Attitude of Russians to New Innovative Practices and Digital Technologies

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Abstract

One of the trends of modern development is the introduction of innovations in everyday life. The population's choice of value priorities in the use of digital technologies depends on a number of factors, including economic, political, social, interpersonal and others. What factors determine the choice of a behavioural trajectory in terms of the use of innovative goods and services? The paper uses the results of a sample study conducted in 2017 in the Moscow region as an information base. The sample of the study included 1115 people aged 15 to 86 years, including 55.5% of women and 44.5% of men. The results obtained in the course of the study allow us to assess the needs and satisfaction of the Russian population with the use of innovative goods and services. The majority of respondents have experience in using innovations and digital technologies. Although the prevalence of individual innovations in the daily lives of Russians varies significantly. The most popular among respondents are different types of gadgets, mostly for communication or entertainment. The spread of online educational services at various levels of education, the experience of their use, forms a positive attitude to innovation in General, convinces of their usefulness in everyday life.

Keywords: innovation, development, wood classifications, innovative behavior

Advancements in technology and a rapid rate of change in the information space, which gave rise to the phenomenon of the digital economy, have contributed to the formation of a new infrastructure and business environment, opened up extra means for the development of individuals and social groups, and improved the population quality of life. At the same time, new challenges and threats to the social development have emerged. The human customary living environment is undergoing changes, the labor market is transforming, and social relations are reshaping [1]. The current situation poses a number of research problems. In one respect, the assertion about the impact of innovation on the quality of life and social lifestyle has become a truism. However, the issue is still left pending as to how do they diffuse in society, what human needs act as a catalyst for this process? What factors influence different approach of people to innovations?

Sources and Methods

The paper used data from a number of sample surveys, which provide an idea of the prevalence of use of innovations among various social groups in Russia. This is the Comprehensive survey of

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the living conditions of the population [2] conducted as monitoring by the Federal State Statistics Service since 2011 (currently it is carried out once every two years, a sample size is 60 thousand households), as well as the Russian Monitoring of Economic and Health (RLMS-HSE) conducted since 1994 by the National Research University *Higher School of Economics* and Demoscope LLC with the participation of the University of North Carolina Population Center at Chapel Hill and the Institute of Sociology of the Federal Research Center of Sociology of the Russian Academy of Sciences. The sample size is about 12,000 respondents. The study used the 2016 round of research. The identification of factors determining the attitude of Russians towards innovation was carried out based on the data from a sample study conducted in 2017 with the participation of the author in Moscow and the Moscow Region. The study sample included 1,115 people aged 15 to 86 years.

In order to identify factors affecting the prevalence of use of innovations by the Russians, the following indicators were chosen: use of a tablet to access the Internet, attitude to innovations. The application of the classification tree method made it possible to determine the key factors that influence the use of innovative technologies in everyday practice and the attitude of Russians towards innovations as such.

Approaches to the innovation impact analysis on the quality of life

Most papers in identifying the impact of innovation on social life relate the economic effect, the effectiveness of the economic performance [3; 4; 5; 6; 7]. An analysis of innovations and the identification of a set of indicators reflecting their impact on the standard of living and quality of life is presented in a number of papers by modern researchers. A.J. Cohen in the article "Innovation and Economic Growth" [8] based on statistical data shows the impact of innovations on the social standard of living and the economy of America. The subject of the analysis is the impact of scientific and technological achievements on the emergence of new products.

Evangelista, Guerrieri and Meliciani examine the impact of access to information technology on socio-economic development. The result of the study confirmed the authors' hypothesis that the use of ICT has a significant impact on the economy, in particular, on employment rate: digitalization can promote labor productivity and employment growth, as well as narrow the gap between the incomes of the "rich" and "poor" segments of the population [9].

Greenstone and Looney [10] describe 12 parameters of innovative development that, in their opinion, affect different areas of life in the USA. In particular, innovations increase life expectancy, affect the lifestyle and quality of life of the population, make technology more accessible to different groups and segments of the population, as well as leave more time for family and hobbies.

A special part in the research is dedicated to the issue of the impact of innovation on demographic processes, in particular, mortality, morbidity and life expectancy [11, 12, 13, 14]. The relationship between innovation and social development, which was measured on the basis of the Global Innovation Index (GII) and the Human Development Index (HDI) for 108 countries was explained using the logistic curve in the paper by M. Arkhipova and V. Sirotin [15]. It was established that assessments of the standard of living in the country, both objective (based on the Human Development Index, HDI), and subjective, largely depend on a number of characteristics of the scientific and innovative activity [16].

An objective idea of the impact of the prevalence of innovative technologies on the standard of living and quality of life of the population, as well as the identification of factors that determine the demand of various socio-demographic groups for creating innovations is impossible without the use of a wide range of sample surveys conducted as monitoring, which allow obtaining the micro- and macro level representative data.

Despite the representative number of publications dedicated to the role of innovation and technology in modern society, there is a lack of papers analyzing the factors determining the

choice of Russians and their need for new technologies, goods and services. In recent years, the Federal State Statistics Service has been expanding the range of sample surveys, which within their program enable to get an insight about the demand of Russians for innovation.

However, research programs are formulated in such a way that they primarily address the issue of using remote access technologies in education, employment, and utilization of public services. The exception, perhaps, is the Sample Survey of Household Budgets, the data of which give an idea of the availability at households of high-tech equipment, and the Sample Survey "Reproductive Behavior of Russians", which identified the need of Russians in modern reproductive technologies. The advantage of the surveys conducted by the Federal State Statistics Service is the representativeness of the data obtained both in relation to the population of Russia in total, and of individual regions. However, the sample surveys conducted by the Federal State Statistics Service do not give an idea of the need for a wide range of innovative goods and services and the range of their use (household goods, energy-saving technologies, medical goods and services, etc.). Special surveys are required in order to obtain this kind of information.

The data of the Russian Monitoring of Economic and Health (RLMS-HSE) conducted for more than 25 years enable to get an insight about the prevalence of modern information technologies in the everyday life of Russians. Since 2009, the Institute of Statistic Studies and Economics of Knowledge of the National Research University Higher School of Economics has been conducting surveys in Russia related to the innovative climate and innovative behavior of Russians [17]. Studies suggest that it is the development of tools that promote user innovation that contributes to the involvement of the population in innovative processes, a significant improvement in the quality of products and services and the expansion of new and traditional markets [18]. However, so far the consumer behavior of Russians is rather inertial and remains stable, despite the increasing prevalence of new technologies in everyday life [19].

The prevalence of innovation in the everyday life of Russians

According to the 2018 round of the Comprehensive Survey of Living Conditions of the Population conducted by the Federal State Statistics Service, 72.9% of respondents above 15 years of age answered that they use the Internet (64.4% in 2016).

Age-related differences in the use of Internet technologies persist, although their decrease is of particular note. In 2018, the proportion of people using network services below 19 years of age was 99% (85.1% in 2011), decreasing to 92.5% by the age of 35-44 years (69.3%) and to 11.5% above the age of 70 years (5.7%).

An analysis of the goals of Russians accessing the Internet enables to conclude that the entertainment function of the Internet prevails and using it as a means of communication prevail. By a wide margin, the use of the Internet for communication on social networks follows with 41.9% of respondents. A third of Russians use the Internet to receive news, 24.8% download games, movies and music online. Every seventh Russian uses the Internet to carry out financial transactions. A minor proportion of respondents in the 2016 survey responded that they went online to search for or perform paid work (5.7%), discuss social and political issues (4.3%), as well as complete study programs using distance learning technology (2.4%).

In their everyday lives, a minor part of the population currently uses the Internet to purchase goods, more often for buying clothes, shoes and household appliances (15-17% of respondents). The population's choice of value priorities in the use of digital technologies depends on a whole range of factors (economic, political, social, interpersonal and others). Of considerable interest is a quantitative analysis of the factors that determine the choice of a particular behavioral trajectory from the point of view of using information and communication goods and services. In order to study the social characteristics of respondents, depending on their attitude to the use of digital technologies,

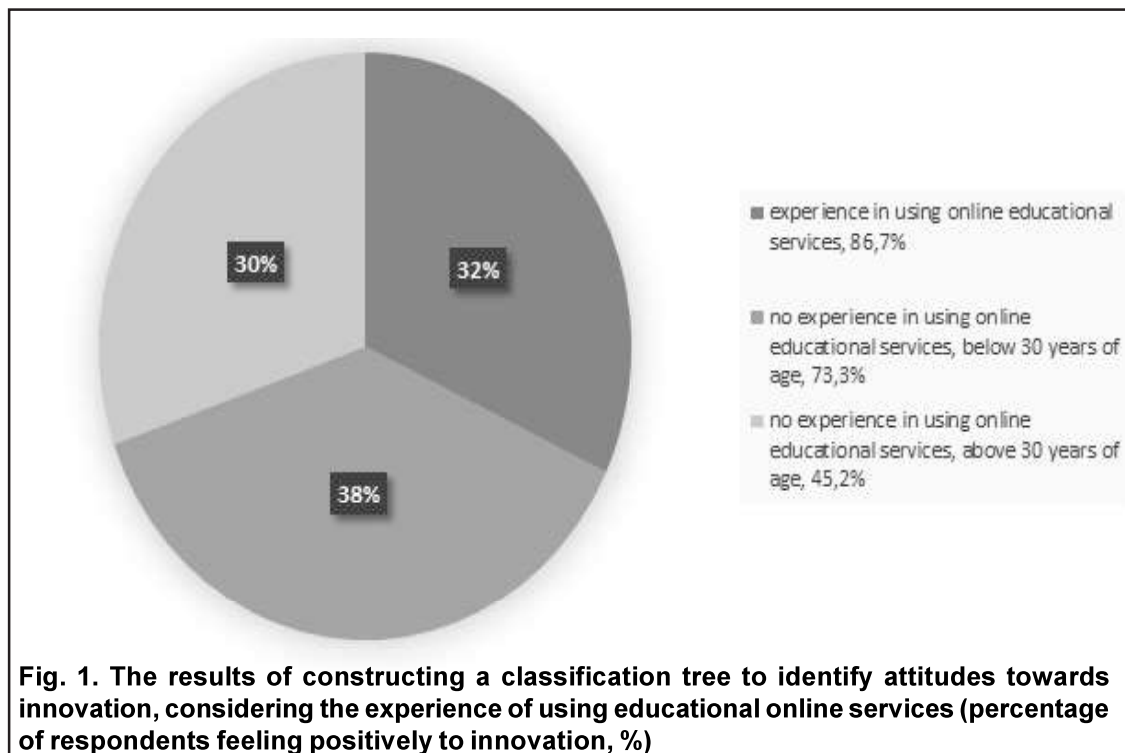
a sample survey of respondents was conducted in the spring of 2017 in Moscow and the Moscow Region. The study enabled to identify a group of respondents who are more susceptible to new information technologies, as well as to examine their main characteristics.

The survey results indicate that the majority of respondents have experience in using innovative goods and services, as well as digital technologies. Although the prevalence of certain innovations in the everyday life of Russians varies significantly. The most popular among respondents are various types of gadgets (they were used by more than $\frac{3}{4}$ respondents). This is followed by "smart" devices and energy-saving technologies (every second respondent). The experience of using various types of medical devices and goods (46.4%), electronic displays (43.8%), and sporting goods (32.8%) is large-scale.

Information and communication technologies have become ingrained in the everyday life of Russians, significantly changing their usual way of life. According to the survey, more than half of Russians (53.8%) believe that innovative goods and services, as well as digital technologies, have a significant impact on their life or lifestyle. By giving free-format answers to the question, the respondents first and foremost mentioned the Internet, a home computer, various gadgets and mobile communications.

Factors in relation to innovation

An important issue is the study of factors determining the attitude of the population towards innovations and, accordingly, their relevance. In order to identify the main variables that affect the attitude of Russians to innovation, the method of constructing a decision tree was used. The variable "How do you feel about innovation?" Was used as the target variable (among the entire population of respondents, 69.1% feel positive about innovations and tend to use them in their everyday life).



Initially, the following variables were selected as predictors, which, admittedly, can influence the respondents' attitude to innovations and allow the formation of individual socio-demographic groups of respondents: gender, age, educational level, field of activity, experience in using various innovative goods and services, attention to innovation ("Do you follow the emergence and development of new products or services?"; "What area of activity do you think is lacking in innovation?"). However, the final models included only the following independent variables: age, the use of online educational services, and attention to innovation. Thus, the hypothesis about the influence on the attitude to innovation of a number of factors has not been confirmed.

After the analysis, the models obtained using the CHAID method were selected. Among all the possible options for constructing decision trees, two were selected that most accurately describe the available data. The best predictor for the target variable "How do you feel about innovation?" were recognized such variables as "the use of online educational services" and "attitude to the emergence of new goods or services". The differences in the distributions were checked using the Chi-square test.

Both of the constructed trees consist of three levels and contain 3 terminal nodes. The root node includes 307 observations, of which 212 observations correspond to respondents who fell positive about innovation, 78 feel "with caution" and 17 feel "negative".

Using the cross-validation procedure, which allows evaluating the use of the classification tree on a larger population, it was shown that the models are stable and common enough for all data sets: the risk values for the model without verification and with verification practically did not differ. The matrix of predictions containing the percentage of correctly predicted values enabled to conclude that the constructed model (classification tree) is stable, of acceptable accuracy, which allows to use the constructed classification trees for other data sets.

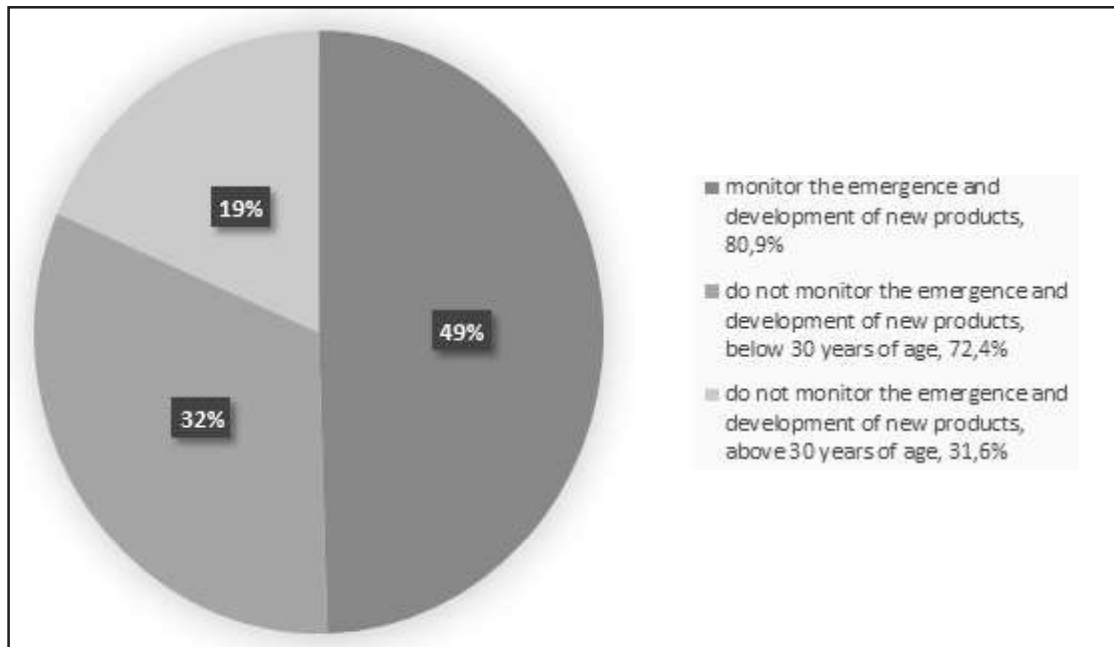


Fig. 2. Classification tree for identifying attitudes towards innovations depending on attention to innovations (percentage of respondents feeling positively to innovations, %)

Figure 1 shows the results of constructing the first tree, which is the best among the constructed models. The risk assessment is 0.167 (with a 5% significance level, the model error is in the range of 15% to 17%). The acceptable quality of the model is evidenced by a fairly high percentage of respondents classified correctly. According to the constructed model, 83.3% of respondents are assigned to one of the selected groups correctly.

The first group included respondents with experience in the use of online educational services, among them the percentage of positive attitude to innovation was 86.7%. Among those who have not used online education in the recent past, two groups stand out depending on age. Among those under the age of 30 years, the percentage of positive attitudes towards innovation was 73.3%; among respondents over 30 years of age it was 45.2%.

For the second classification tree, the risk score is higher - 0.257, i.e. 74.3% of observation cases were classified correctly (Fig. 2). If we disregard the experience of using online education services, the main predictor for identifying the respondents' attitude to innovations is the fact that the respondent is interested in using innovations and his/her awareness of new types of innovative goods and services. That is, those respondents who actively monitor the advances of innovations have a positive attitude towards them (among these, the percentage of those who feel positive about innovations and want to use them in their everyday life is 80.9%).

Among those who are not interested in innovations (do not monitor the emergence of new goods or services), the attitude to innovations depends on age: among younger respondents (under the age of 30 years), the proportion of positive attitude towards innovations is 72.4%; among people over 30 years of age, it is 31.6%. Among mature-aged people who are not interested in innovations, there are much more of those with cautious attitude towards innovations (59.6%). (Fig. 2).

Among the variety of economic, social and economic characteristics, it is difficult to single out those that uniquely affect the attitude of Russians towards innovation. Basically, a positive attitude towards innovations and information and communication technologies is determined by the experience of using modern technologies in the educational process, the age of the respondent (remarkably, younger Russians are primarily experienced in using online technologies in the educational process) and the interest (willingness) of respondents to use innovation and digital technology in their everyday life.

Attempts to build classification trees that take into account such parameters as the field of activity, educational level, place of residence, standard of living, human mobility in the context of attitudes towards innovation were unsuccessful. There is a situation when the attitude to innovation is determined largely by the psychological characteristics of the respondent, his/her willingness to perceive innovation. Age, as an important predictor, begins to play a role in situations where a person is not too susceptible to innovation. Of particular note is the role of education in shaping attitudes toward innovation [20]. The prevalence of online educational services at various levels of education, from preschool to continuing education system, the experience of their usage creates a positive attitude to innovations in general, and convinces of their usefulness in everyday life.

The RLMS-HSE program allows to supplement the performed analysis with data on the impact of the place of residence and area of activity of respondents on the scale of using modern technologies in everyday practice. As an indicator of such activity, the variable "use of a tablet to access the Internet" was used. Seemingly, the usage of a tablet characterizes a situation where respondents use the Internet in non-stationary conditions to address a number of professional and everyday tasks. Thus, information and computer technologies are incorporated into everyday life. For analysis, we used the data from the wave XXV research (2016).

The following variables were selected as the best predictors for the target variable "Do you use a tablet to access the Internet?": type of populated locality and professional group. Age and

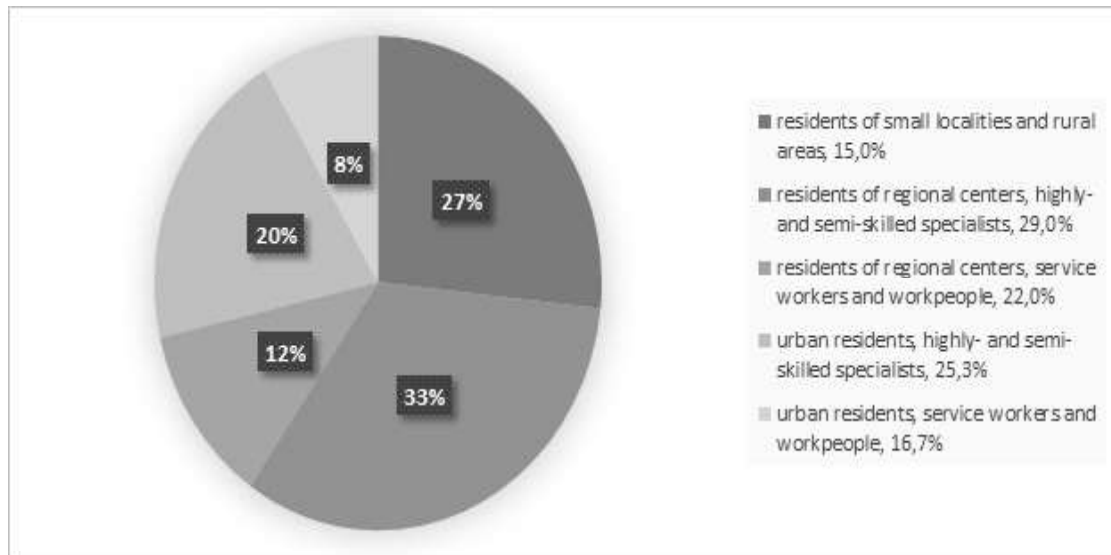


Fig.3 : Classification tree to identify the frequency of using the tablet to access the Internet (percentage of respondents using the tablet)

area of activity were not included in the final model. As a result of the analysis, 5 terminal nodes were formed. The leading role in the formation of typological groups was played by the variable "type of populated locality". In the aggregate (11,368 respondents), 22.7% of respondents use a tablet to access the Internet. In this regard, for residents of small populated localities, urban-type settlements and rural areas (15.0% use a tablet to access the Internet), the area of activity does not affect the frequency of use of the tablet.

Residents of cities are divided into 2 groups in terms of the frequency of using the tablet to access the Internet: among those who work as specialists, senior managers, public officials, lawmakers, the proportion using the tablet to access the Internet is 25.3%. Among urban residents working in the service sector, as well as skilled and unskilled workers, the proportion using a tablet to access the Internet is 16.7%.

A similar situation is observed among residents of regional centers, but in their case, a tablet is used more often to access the Internet: by 29.0% of specialists and managers, and 22.0% of workers and employees in the service sector.

For this model, the risk score is 0.227 (with a 5% significance level). According to the constructed model, 77.3% of respondents are correctly assigned to one of the selected groups. Neither the age of the respondents, nor the educational level, nor the area of activity in this case also played a significant role in the formation of typological groups. Using a tablet to access the Internet is determined by the lifestyle and quality of life in larger populated localities (cities) and the professional activities of respondents.

The analysis allows suggesting an ambiguous choice of factors that determine the attitude of the population to innovations and the extent of their use in practice. The age of respondents is far from being always a significant factor. At the macro level, the parameters of the lifestyle and quality of life in various types of populated localities are among the impact factors. The personal experience of the respondents, in particular, in the field of education, and life strategies play a role in shaping attitudes toward innovation.

The research prospects are perceived in the development of a methodology for the formation of integrated indicators of innovative activity of the population based on qualitative and quantitative characteristics, as well as the use of statistical modeling methods in this prospect.

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