Information Society: Analyzing Problems and Prospects of Using Information Technologies, Computers and Communication Networks

Elena M. Votinova
Moscow University of Humanities and Economics, the Northwest Branch, Russian Federation.
E-mail: evotinova@yandex.ru

Maksim V. Votinov
Moscow University of Humanities and Economics, the Northwest Branch, Russian Federation.
E-mail: votinovmv@yandex.ru

Abstract

The study is devoted to actual issues of using information technologies, computers and communication networks by the Russian citizens and companies. World experience shows that the competitiveness of the national economy is directly related to the development of information technologies, being the driver of social and economic growth. The purpose of the research is to analyze the problems and prospects that form the information society in Russia. All the collected information was analyzed and synthesized, which is one of the currently progressive methods of scientific cognition. The article reveals how effectively the population uses information technology, the forecasting of the main research indicators is carried out and the prospects for their development are determined. The study provided a comprehensive assessment of the national potential in the field of information and communication technologies, and also made it possible to identify certain problems and factors constraining the development of the information society. The obtained results can be useful in activities aimed at the further development of the information society and involving the population in the use of new forms of interaction.

Keywords

Introduction

The technical, organizational and managerial changes that are taking place at the present stage of the society development are closely connected with the rapid development and dissemination of information technologies. Every year information technologies have an increasing impact on the economy of the country in general and on everyday life, they are opening wider prospects for improving business efficiency and the quality of the citizens' life.

Today, it is impossible to imagine any branch of the national economy in which information technologies, computers, and communication networks would not be used. Gadgets and social networks filled the minds of people. Information technology is becoming a determining factor in the development of society. Information is produced, processed, stored, presented and distributed. Therefore, the concept of "information society", which was born in the last century (Crawford, 1983) is now more important than ever. However, it is worth noting that at the present time, the "information society" notion is understood as a society in which the majority of workers are engaged in the production, storage, processing and sale of information.

The scale of the development of the information society is so impressive that it makes some researchers think about the development consequences of the digital age and the need for the development of digital culture (Vania, 2017). Some skeptics compare the digital age with nuclear weapons and its potential threat to scientific and technological progress in the past (Lolas, 2017).

Today, the socio-cultural aspects of the "Internet" and information technologies are developing (Jing & Guoqiang, 2018). Modern studies on the philosophy of information are being formed and the notion of information skepticism is singled out (Ladov, 2017). The work of the scientists from the National University of Distance Education showed that even in the conditions of the economic crisis, on the example of Greece, the information society retains its advantages for solving economic problems (Jurado-González & Gómez-Barroso, 2016).

The IT industry is the most dynamically developing both in Russia and in the world. Rapidly penetrating into all spheres of human activity, it becomes today one of the most significant in terms of impact on the social sphere, the economy, the image and status of Russia in the world community.

World experience shows that the competitiveness of the national economy is directly related to the development of information technologies: according to the World Economic Forum, the competitiveness index of the states' economy has a close relationship with the level of technological development (Global Competitiveness Index, 2018). In the first place of the countries ranking on the Global Competitiveness Index is Switzerland, Russia is ranked 38 of 137. Figure 1 shows a diagram of parameters characterizing the index of global competitiveness of Russia in relation to the generalized index of Eurasia.
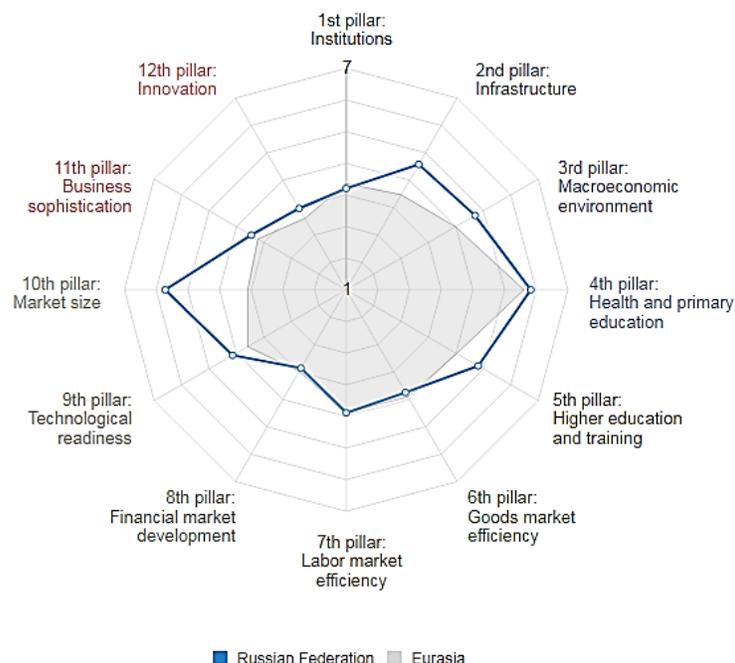
Figure 1. The index of global competitiveness of Russia

Figure 1 show that the level of technological development in Russia is higher than the average for Eurasia, at the same time, Russia occupies the 57th place in terms of technological development. In the rating of the International Telecommunication Union on the index of the development of information and communication technologies (ICT Development Index) Russia in 2017 is ranked 45 of 176, which is twice worse than the year before (ICT Development Index, 2017).

It is obvious that the further development of information technologies contributes to the discovery of new opportunities and prospects for development, but today a comprehensive assessment of the national potential in the field of information technologies is needed. At the same time, the processes of information technologies dissemination in the society, their mastering by the population of Russia are extremely uneven. On the one hand, the active use of personal computers and the Internet by various social strata indicates that appropriate practices become an indispensable attribute for the way of life of the overwhelming majority of the country's population. On the other hand, not all users open a window into the world of information technology. The overall level of involvement of the population in the information society remains low in Russia. The most popular functions of the global network today are communication, entertainment, and information. More and more Russian citizens begin to use the opportunities of e-commerce, as well as communicate with public authorities in electronic form.

The purpose of the conducted study was to analyze the problems and prospects of using information technologies, computers and communication networks that form the information

society in Russia.

The interest is caused by the extent to which the population, in particular households, uses personal computers and communication networks, such as the Internet, as well as the spread of broadband access. The questions are: how effectively the population uses the opportunities of e-commerce and e-government and how the state and companies are prepared for a successful functioning within the information society.

The study highlighted the problems that hamper the development of the information society in Russia, gave recommendations for improving the integration of information technologies in the citizens' everyday life, and also carried out a forecast of changes in the main research parameters until 2020.

Materials and Methods

In Russia, the desire for complete informatization of society was born in the first decade of the 21st century. It was at the time when basic documents and programs emerged, they determined the development and use of information and communication technologies. In 2002, the state program "Electronic Russia" was approved for the period from 2002 to 2010, and the development concept of CALS-technologies in Russian industry was adopted. Since then, these directions have been continuously developing, although they have some problems on their way of development. At the same time, the state is interested in their analysis and study. For these purposes, a regulatory and legal framework is being developed, that includes: the Russian Federation state program "Information Society (2011-2020)", approved by the Russian Government's Resolution no. 313 on 15 April 2014, the Information Technology Development Strategy for the Russian Federation for 2014-2020, renewed until 2025, approved by the order of the Russian Federation Government on 1 November 2013 no. 2036-r, the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030, approved by the decree of the President of the Russian Federation on 9 May 2017, No. 203 (Resolution of the Government of the Russian Federation on January 28, 2002, no. 65; Resolution of the Government of the Russian Federation on April 15, 2014, no. 313; Order of the Government of the Russian Federation on November 1, 2013, no. 2036-r; Presidential Decree on May 9, 2017, no. 203; Sudov & Levin, 2002). This regulatory framework provided the basis for our study.

The statistical information of the Federal State Statistics Service (Rosstat), the Unified Interagency Information Statistical System (UIISS), the Statistical Office of the European Union (Eurostat) was used to analyze the problems and prospects for the development of the information society in Russia. The materials of the Department of Economic and Social Development of the United Nations, International organization World Bank, the World Economic Forum and the International Business School INSEAD, as well as the developments of the

Institute for Statistical Studies and Economics of Knowledge of the National Research University "Higher School of Economics" are used.

It should be noted that the statistics of the information society is the newest direction of social and economic statistics aimed at studying all aspects of activities related to the production and dissemination of information technologies, as well as their application in the economy, social sphere, public and private life. Thus, in particular, the Federal State Statistics Service constantly conducts statistical observations on the use of information technologies, information and telecommunications networks by the citizens and companies. Only the analysis of statistical data in conjunction with the planned goals of the programs, strategies and development concept allow revealing the penetration scale of modern information technologies into the daily life and the degree of their accessibility for citizens throughout Russia.

As methods of scientific knowledge, theoretical methods and methods of research were used in the work. All the gathered information was analyzed and synthesized. The general logical method was also used, which implies the identification of the most significant aspects in any process. Much attention is paid to the adoption of a systematic approach, based on the consideration of various objects (components) as a single dynamically developing system.

Information technology and society

Nowadays, Russia faces the task of speedy formation and development of the information society with the aim of improving the population's quality of life and ensuring the country's competitiveness. There are several areas of work. First of all, the development of the economic, socio-political, cultural and spiritual spheres of society, the improvement of the public administration system, based on the use of information and telecommunication technologies, as well as ensuring the competitiveness of products and services in this field.

The goal of the information society development in Russia is to obtain maximum benefits from the use of innovative technologies by citizens and organizations. This goal is achieved through the provision of services to citizens and organizations using modern technologies, as well as ensuring the rights of citizens to access information. At the same time, traditional and customary non-digital forms of obtaining goods and services should be preserved. At the same time, the development of the technical and technological basis for the formation of the information society must be accompanied by the state protection of the Russian citizens' interests in the information environment.

At present, the trend towards the development of the information society is obvious. So, for the convenience of using the services in electronic form, dispersed databases of various ministries and departments are combined into unified information systems, such as the State Services portal, the Unified Interagency Information Statistical System. At the municipal level, there are

uniform medical, school, and administrative portals. The state authorities bring information to the public using their official websites. Broadband Internet access technologies are developing, and the number of devices that allow access to the network is increasing.

To implement the goals of the information society's formation and development, the Ministry of Telecom and Mass Communications of the Russian Federation developed a state program "Information Society". The program identifies the main activities, as well as indicators (targets) of its implementation until 2020.

The program contains a large number of indicators; some of them are similar to those used by the International Telecommunication Union for the calculation of the ICT Development Index (The ICT Development Index, 2017). In particular, the dissemination of information and communication technologies is based on the analysis of households with personal computers and access to the Internet. The most attention is payed to the households with broadband access to the network. The important fact is how and with what purposes the population uses modern technologies.

The State Program "Information Society" forecasts the creation of a modern information and telecommunications infrastructure throughout the Russian Federation by 2020, ensuring the availability of high-quality communication services, including services to provide broadband access to the information and telecommunications network "Internet". It is expected that by 2020 the level of digitalization of the local telephone network in urban areas and in rural areas will be respectively 89 percent and 76 percent. At least 95 percent of the country's households (72.8% in 2016) should have access to the Internet. At the same time, the share of citizens using the way for obtaining state and municipal services in electronic form should be at least 70 percent (50% in 2016) (Resolution of the Government of the Russian Federation on April 15, 2014, no. 313).

The program "Information Society" features a high degree of the Russian Federation integration into the world information society, while the program includes the issues of the information protection, taking into account privacy, personal and family secrets, as well as the security of information with limited access (Resolution of the Government of the Russian Federation on April 15, 2014, no. 313).

The Federal State Statistics Service annually performs selective federal statistical observation on the use of information technology, information and communication networks by the population, in which about 30,000 households are surveyed (Selective federal statistical observation on issues of population usage of information technologies, information and telecommunication networks).

The survey shows a good growth dynamic in the use of information and communication technologies by the population of Russia, Figure 2. Thus, in particular, the share of personal

computers used in households increased by 3.3 percent in 2016 as compared to 2014 and amounted to 74.3 percent of the total number of households. The number of households using Internet access increased by 4.9 percent. In 2016 this indicator was 74.8 percent, which is 2 percent higher than predicted by the state program "Information Society". It is worth noting that 70.7 percent of households use broadband access to connect to the Internet. However, compared to the EU countries, these indicators are somewhat small. So, according to Eurostat in 2016, 80 percent of households used personal computers, 85 percent had access to the Internet, including 83 percent - broadband access (Eurostat).
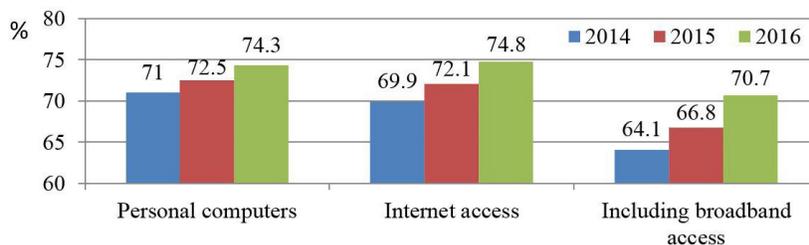
Figure 2. Households with personal computers and access to the Internet (as a percentage of the total number of households)

Considering households by types of devices used to access the Internet, it can be concluded that more of them still use personal computers (PCs, laptops, notebooks, tablets -70.3 percent in 2016). The distribution of households by types of devices used to access the Internet is shown in Figure 3.
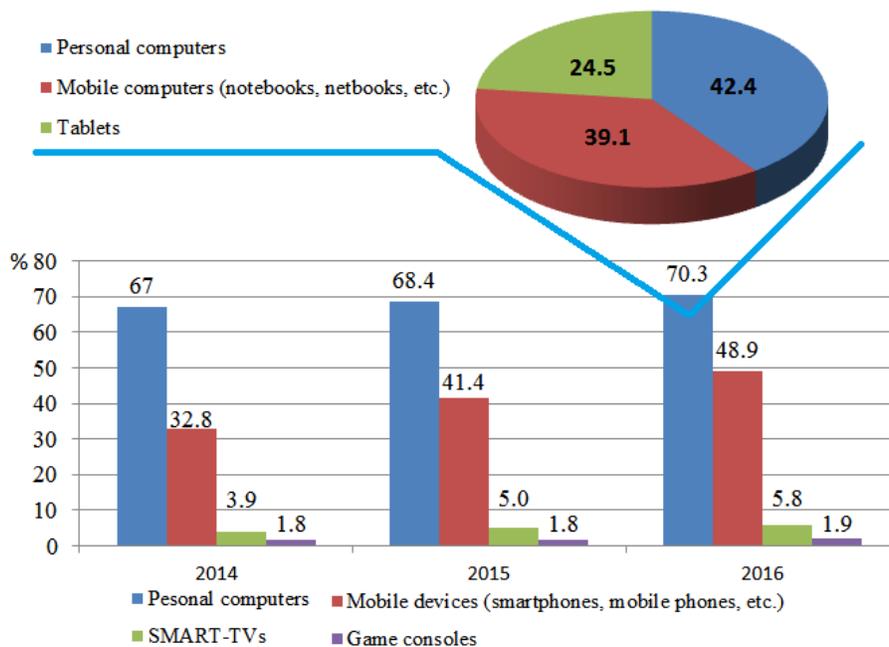
Figure 3. Distribution of households by types of devices used to access the Internet (percentage of the total number of households)

At the same time, the number of households using mobile devices (mobile phones, smartphones and others) for Internet access increased significantly, 48.9 percent in 2016, compared to 32.8 percent in 2014. The least used for Internet access in households are SMART TVs and game consoles. However, from year to year these figures show steady growth. For example, TVs with SMART functions in 2014 used 3.9 percent of households, and in 2016, 5.8 percent.

A different situation is in the countries of the European Union. According to the data in 2016, about the same number (76%), as in Russia (70.3%), households used personal computers to access the Internet. However, mobile devices also have the same popularity (76%), which is 27.1 percent more than in Russia. It should be noted, that among the European citizens SMART TVs and game consoles are also popular to access the Internet (12% and 9% respectively).

It is obvious, that the greater distribution of mobile devices favors the possibility of more frequent access to the "Internet" and the use of all the available benefits of the information society. Indeed, about 42.4 percent of households from the total number of households work on personal computers (stationary PCs). In other words, they have the opportunity to access the Internet only when they work on them. Mobile devices also allow the user to connect to the network from anywhere, wherever he or she is.

The total area of Russia is 17,125,191 km², which directly affects the specific use of information and communication technologies in households of its various regions. Also, the degree of information and communication technologies use is more affected by the place of household residence. Thus, according to Rosstat, out of 146.8 million people, 109 million live in urban areas, and 37.8 million in rural areas (Demographic Yearbook of Russia, 2017). Table 1 shows the distribution of households with personal computers and access to the Internet by type of location (Laikam et al., 2017).

Table 1. Distribution of households with personal computers and access to the Internet by location type, percent

Parameter, 2016	Consolidated indicators	Location type	
		Urban area	Rural area
Personal computers	74.3	78.4	61.7
Internet access	74.8	78.5	63.6
Including broadband access	70.7	75.2	56.9

According to Rosstat, the digitalization level of the local telephone network in the urban area is 92 percent, and in rural areas - 81.3 percent, which is 3 percent and 5.3 percent respectively higher than planned by the state program "Information Society". However, in conjunction with the information provided by Table 1, we can see the obvious regularity of the fact that in rural Russia information technologies are less common than in urban areas. Considering the use of information and communication technologies in the context of the federal districts of the Russian

Federation (Laikam et al., 2017), Table 2, we can single out as the most "advanced" in this regard the North-Western, Southern and Far Eastern federal districts.

Table 2. Distribution of households with personal computers and access to the Internet by federal districts, percent

Federal districts	Personal computers	Internet access	Including broadband access
Nationwide (Russian Federation)	74.3	74.8	70.7
Central federal district	77.5	75.9	72.6
North-Western federal district	81.0	80.7	77.0
Southern federal district	75.7	77.0	74.9
North Caucasian federal district	61.4	72.1	61.5
Privolzhsky federal district	71.1	71.6	68.6
Ural federal district	75.3	76.3	72.5
Siberian federal district	71.2	70.9	64.3
Far Eastern federal district	72.2	76.5	70.1

At the same time, according to Table 2, a high degree of differentiation of the Russian Federation federal districts in the use of information and communication technologies is evident. So, particularly, in the North Caucasian federal district, only 61.4 percent of households have a personal computer, while the highest indicator is 81 percent in the North-Western federal district. A similar situation develops with the Internet access. The highest indicators are observed in the North-Western federal district (80.7%), but the Siberian federal district and the Privolzhsky federal district have by 10 percentage points less indicators (70.9% and 71.6% respectively). However, for most of the country, excluding extreme cases of using information and communication technologies, the indicators, at average, vary within ± 3 percent.

It should be noted that the issues of the development differentiation of information technologies are peculiar not only for Russia, but also for the countries of the European Union. In particular, there are studies that reflect the gap in the penetration of information technology between European developed countries and post-communist countries (Dolničar et al., 2014; Zoroja, 2011).

Some researchers suggest rather interesting methods for assessing differentiation, based not on calculating the number of installed equipment units, but operating with the available opportunities for processing information (Hilbert et al., 2010). Application of such techniques in the future can reveal a deep aspect of the uneven development of information and communication technologies between different regions and countries.

The conducted surveys among households highlighted the main problems that prevent the use of the Internet network in households (Selective federal statistical observation on issues of population usage of information technologies, information and telecommunication networks).

Among the most common reasons are: lack of desire, lack of skills, high cost of connection, Table 3.

Table 3. Reasons for the Internet non-usage in households of urban and rural areas (the number of households, percentage without access to the Internet), percent

Reason	Urban area	Rural area
No need (lack of desire)	72.2	65.1
Lack of skills to work in the Internet	19.8	21.1
High cost of connection	16.4	18.3
Availability of the access at other place (at work, at friends, etc.)	9.0	5.6
No technical possibility	3.2	12.9
According to security and confidential conditions	0.6	0.5
Other reasons	8.3	9.3

Analyzing the data from Table 3, we can conclude that the popularity of reasons for not using the Internet network is identical for both urban and rural households. It is noteworthy that, though the "Internet" is more common in urban areas than in rural areas (78.5% versus 63.6%, Table 1), among the answers on the reasons for its non-use in households, the answer "No need" was given more by households from urban areas (72.2% versus 65.1%, Table 3). At the same time, rural residents more likely face the lack of technical possibility than urban ones (12.9% versus 3.2%). Thus, the Russian citizens' usage indices of information technologies depend not on the remoteness of the regions or federal districts from the capital, but on the remoteness of the rural area from the regional center.

According to research conducted by Latvian scientists, information and communication technologies are an instrument for the development of society, especially in remote, rural areas (Meijere & Tambovceva, 2016). Obviously, it is the development of information technologies and communication networks in rural areas that will allow increasing the overall index of the development of information and communication technologies in Russia.

The use of the Internet by the population is connected with the use of services in electronic form. According to Rosstat research, among the population aged from 15 to 72 years, the Internet is more often used to participate in social networks (78%) (Laikam et al., 2017). The second most popular place takes the download of multimedia content (51.4%). Then, the search for information about products, making phone calls, as well as working with e-mail, which is 43.8 percent, 43.6 percent and 41.6 percent, respectively. Twenty-three point one percent of the population uses the "Internet" to purchase goods and services. The attention should be paid to the fact that the "Internet" plays not only the role of an entertainment environment. Thus, 22.5 percent of the population uses the Internet for financial transactions, 8.5 percent use the network to find the work. It is worth noting that 2.7 percent of the population uses the "Internet" to improve their professional level, using distance learning forms.

An important criterion for the development of the information society is the use of public services in electronic form, as well as interaction with public authorities through telecommunications channels. It's no secret that information technologies are being developed to promote the economic interests of the state (Sucu, 2017). The idea of the development of e-government in Russia is inseparably linked with the issue of increasing the civil service efficiency on the basis of modern management methods (Irkhin, 2007).

According to statistics, the share of citizens using the mechanism for obtaining state and municipal services in electronic form in 2016 augmented to 51.3 percent, which is 1.3 percent higher than the level set by the state program. Mostly, the interaction is carried out through official websites and portals of government authorities. From year to year, the popularity of using electronic communication with authorities grows. So, in 2014 this indicator was 35.2 percent, which is almost 1.5 times less than the current one.

Twenty-two percent of the population is registered on the Unified Portal of State and Municipal Services. Moreover, 4.3 percent of the population has an electronic signature, which allows to participate in electronic document circulation, without visiting government bodies.

Among the most popular state and municipal services received by the population in electronic form are: public health services (32.4%), tax inspections (18.7%), the Ministry of Internal Affairs and the State Traffic Safety Inspectorate (18.1%).

Today the society is faced with the issues of integrating e-government into the so-called "smart cities" systems and increasing the role of state information and communication technologies in solving urban problems (Anthopoulos Leonidas & Reddick Christopher, 2016).

The target indicator of the state program "Information Society" - "the proportion of citizens using the mechanism for obtaining state and municipal services in electronic form" is successfully implemented and is even higher by 2.3 percent, compared to the EU countries (UN, 2016). At the same time, according to the Department of Economic and Social Development of the United Nations, Russia's e-government development index is on the 35th place out of 193 countries participating in the rating (UN, 2016). The thing is that the average value of three normalized indicators for the three most important aspects of e-government is used to assess its activity: the index of telecommunications infrastructure, the volume and quality of online services, and the index of human capital (Methodology EGDI).

The study shows that the telecommunications infrastructure in Russia is in its formation stage. There are essential questions from the population about the volume and quality of online services. Thus, the low level of the e-government use in comparison with developed countries is due to the fact, that quite often, the population faces problems of obtaining services in electronic form on portals and websites of authorities. For example, 17 percent of respondents observed

technical failures in accessing portals of state and municipal services, 8.7 percent of respondents experienced inadequate or outdated information, 3.1 percent of respondents did not receive timely technical support or assistance.

According to the Human Capital Index, determined by the World Economic Forum in cooperation with Harvard University and the international consulting company Mercer Human Resource Consulting, used in determining the evaluation of e-government, Russia is on the 16th place out of 130 (Methodology EGDI).

Thus, in order to develop the idea of e-government, it is necessary not only to increase the number of services, provided in electronic form, but also their quality. For this purpose, it is necessary to establish closer cooperation between representatives of government and IT specialists (Marsden, 2018). It is worth noting that the ease of use and clarity of government and municipal portals have a positive impact on the CSI of e-government users (Wirtz, 2016).

Let's note that these issues are not related to the spread of personal computers and access to the Internet network for the population and depend directly on state and municipal structures.

To date, 69.6 percent of respondents, who do not use the advantages of e-government, highlight the desire for personal visit and personal contact with authorities. These respondents represent the potential for the development of the e-government system. Thus, in the issues of promoting e-government to the state, first of all, it is necessary to pay attention to the statistics of the information society, namely: timely update information on the portals of state and municipal services, establish technical support services, in other words, the work on deterrence factors should be maintained.

The problems of the dissemination of the information society in Russia are closely connected with the issues of information security. Confidentiality of information is one of the topical issues in the digital age, as the development of information technology leads to the emergence of new security threats (Minkkinen et al., 2017). In particular, attention should be paid to the confidentiality of "large data" (BIG DATA) (Buttarelli, 2017; Fang Wei et al., 2017) transmitted over the Internet.

Indeed, when most of the information is digitized, and the state strives to develop e-government and informatization of society, there will always be intruders wishing to use confidential information for their own mercenary purposes. Thus, in 2016, 18.4 percent of the population received spam mailing, 13.3 percent of the population became victims of viruses from their personal computers and gadgets, leading to loss of stored information (Laikam et al., 2017). It is noteworthy, that these indicators are decreasing annually, Table 4.

Table 4. Population facing threats to information security (percentage of the total population aged 15-72 years using the Internet), percent

Indices	2014	2015	2016
Unauthorized mailing (spam)	24.5	19.0	18.4
Infected with viruses, leading to loss of information	37.7	17.1	13.3
Didn't face the problems of information security	48.9	65.8	68.9

Further comparison of 2014 to 2016, spam was reduced by 6.1 percent and infection with viruses decreased by 24.4 percent. It is interesting, that even the number of respondents, who have never faced information security problems, increased (48.9% in 2014 and 68.9% in 2016).

In part, such indicators characterize the literacy of the population in matters of information security. Information society statistics show that in 2016, 85.3 percent of the population used information security tools, including antivirus and anti-spam filters. Thus, the analysis of the information technology use by society has shown good dynamics. All the analyzed indicators of the state program "Information Society", as of 2016, are being fulfilled. At the same time, as noted earlier, Russia is ranked 45th in the development index of information and communication technologies (ICT Development Index) in 2017. Obviously, with the electronic government, there are certain prospects and opportunities for the development of information technologies and communication networks, as well as the increase of Russia's position in the rating of the International Telecommunication Union.

Information technology and business

The information society assumes not only the use of information technologies by the population, households and their interaction with the state in electronic form, but also the involvement of business in this process. Today, we can talk about the emergence of a new relationship between classical experts in the services provision, analysts, mid-level executives and citizens, using the information environment (Pedersen & Wilkinson, 2018).

The Federal State Statistics Service annually carries out statistical monitoring "Information on the use of information and communication technologies and the production of computers, software and services in these areas", in which all legal entities participate, except for small businesses.

According to observation data for 2016, there are more than 12,422,000 personal computers in the surveyed organizations, or, if counting relatively, there are 49 computers per 100 employees, 32 of which are connected to the Internet (Federal State Statistics Service of the Russian Federation, Information Society). Figure 4 shows the dynamics of changes in these indicators since 2010.
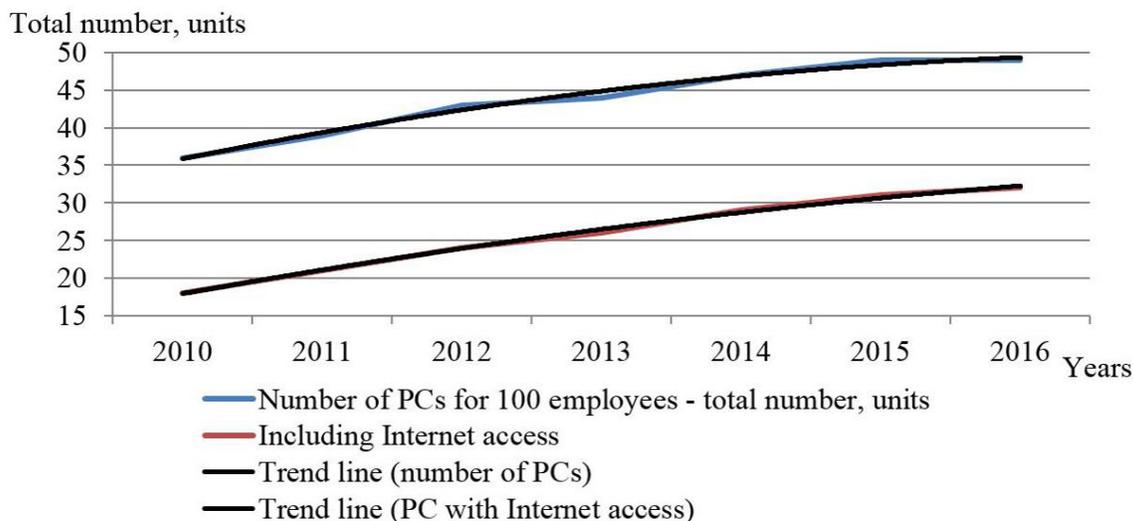
Figure 4. Dynamics of changes in the number of personal computers, including PCs with access to the Internet for 100 employees

The dynamics of the increase in the number of computers in organizations, shown in Figure 4, reflects a well-planned polynomial dependence. Every year the number of personal computers used by employees of organizations is growing. An important fact is that more and more computers are connected to the Internet. It should be noted that the share of organizations using personal computers is 92.4 percent in Russia, and the proportion of organizations using the Internet is 88.7 percent.

At the same time, similar to households, there is a high degree of differentiation of the Russian Federation federal districts in using information and communication technologies. The distribution of the share of organizations that have personal computers and access to the Internet network by federal districts is given in Table 5.

Table 5. Distribution of organizations with personal computers and access to the Internet by federal districts, percent

Indices	Relative share of organizations using personal computers	Relative share of organizations using broadband "Internet"
Nationwide (Russian Federation)	92.4	88.7
Central federal district	94.4	91.1
North-Western federal district	95.9	93.4
Southern federal district	88.9	85.8
North Caucasian federal district	94.6	90
Privolzhsky federal district	91.6	88
Ural federal district	93.2	89
Siberian federal district	89.7	85.3
Far Eastern federal district	93.6	88.5

The Southern federal district has the smallest proportion of organizations using personal computers (88.9%), while the largest number (95.6%) (as well as among households) is in the North-Western federal district. A similar situation develops with access to the Internet. The largest share of organizations using the Internet is observed in the North-Western federal district (93.4%). In the Siberian federal district this indicator is the smallest (85.3%) (Federal State Statistics Service of the Russian Federation, Information Society). Differences between federal districts reach 6.7 percentage points in terms of the use of personal computers and 8.1 percentage points in terms of the use of broadband "Internet".

Analysis of the data in Table 2 and Table 5 shows an even greater degree of differentiation between households and organizations of federal subjects. So, in particular in the North Caucasian federal district the smallest number of households has a personal computer (61.4%), and the share of organizations using personal computers is close to the leader – the North-Western federal district (94.6%). Another example is the Central federal district, where access to the Internet is supplied to 75.9 percent of households (nation-wide average indicator), and the proportion of organizations whose computers are connected to the Internet is one of the largest values – 91.1 percent.

Such differentiation of indicators allows to conclude that many sites, Internet resources and services of organizations will be inaccessible to a number of households, in other words their effectiveness will be underutilized. It is worthwhile to focus on the information and communication technologies used in organizations, Figure 5.
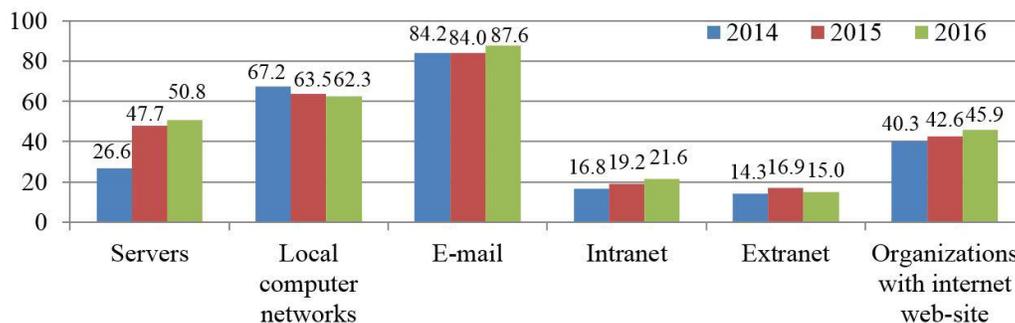
Figure 5. The share of organizations that use information and communication technology (percentage of the total number of the surveyed organizations)

So, according to official statistics in 2016, 50.8 percent of organizations had their own computing servers, and in two years this figure almost doubled from 26.6 percent in 2014. 87.6 percent of organizations use e-mail in their work.

There is a tendency to reduce the number of organizations using local computer networks (62.3% in 2016, compared to 67.2% in 2014), but this is explained by increased use of Intranet and

Extranet networks (21.6% and 15% in 2016). It is well known that, "Intranet" and "Extranet" networks are built on top of local computer networks and allow the implementation of so-called virtual organizations (Cheikhrouhou Naoufel et al., 2013).

Over the past few years, the proportion of organizations that have their own website in the Internet has increased. So, in 2016, 45.9 percent of organizations had their own website, and this indicator was 5.6 percentage points higher than the indicator of 2014. Differentiating organizations, which have web sites, according to the type of economic activity, we can outline: organizations that provide higher professional education (80.9%), organizations that conduct research and development (64.7%), health organizations (64.9%), financial organizations (64.7%).

The development of the "Internet" has led to the virtualization of many traditional social practices. So, the global network has become a trading space, which is mastered by organizations and the population. However, at the moment, online orders have not yet received wide distribution in Russia. Only 23 percent of the population (from the total population aged 15-72 years) made online orders in 2016, bought or ordered goods and services on the Internet, which is 3 percent more than a year earlier (Abdrakhmanova et al., 2017).

Purchase of products in the Internet means acceptance of unusual conditions for the buyer: the lack of visual contact with the seller, the familiar infrastructure of trade enterprises, payment of the purchase before it is received, etc. In terms of the use of the Internet, Russia's indicators are close to the values of Greece, Croatia, Lithuania, Poland, Cyprus, and Portugal. At the same time, the maximum popularity of online shopping among the population of the European Union countries aged from 16 to 76 years is about 45 percent. In other words, Russia is an outsider in terms of the level of popularity among the population to make purchases through the Internet.

To a greater extent, Internet orders have received sufficient distribution among urban residents - 27 percent of them are making such purchases. Among the rural population, this indicator is much lower -13 percent. Engagement in e-commerce varies in age groups. Online buyers are most often found among the population aged from 25 to 39 years (Abdrakhmanova et al., 2017).

According to Eurostat, the share of enterprises receiving orders online increases annually by one percent, and in 2016 it is 18 percent of the total number of enterprises. At more detailed consideration, it can be stated that for small enterprises, with the staff from 10 to 49 people, this figure is 16 percent. For enterprises with the staff from 50 to 249 people, 24 percent of enterprises receive online orders. In the group of large enterprises with the staff number about 250 people or more, more than 38 percent of respondents receive online orders (Eurostat).

It should be noted that using the opportunities of e-commerce, the population often purchases clothes, shoes, sports goods (48%), and household items (26%). Twenty-nine percent of the

population makes financial transactions. Eighteen percent of the population organizes trips using the "Internet" network, buying e-tickets.

Among the ways of paying for goods and services ordered through the Internet, 68 percent of the Russian population prefer to pay by bank cards, 37 percent prefer to pay in cash upon delivery, 13 percent prefer to pay for goods or services through terminals or in the offices of the Russian Post.

At the same time, the development of electronic commerce in Russia is hampered by a number of factors. Thus, 54 percent of the surveyed population, aged from 15 to 72, prefers to make purchases without using a virtual environment. Thirty-seven percent of the population does not see the need for electronic purchases, and 19 percent simply lack confidence in them.

The changes that take place in connection with the development of the information society in Russia also affect the cost structure of organizations for the introduction and use of modern information technologies, Table 6.

Table 6. Distribution of costs of organizations for information and communication technologies by types (percentage of the total number)

Indices	2014	2015	2016
Costs for information and communication technology - total	100	100	100
including:			
purchase of computers and office equipment	22.1	20.3	20.0
purchase of telecommunications equipment	13.1	13.5	11.6
purchase of software	13.8	17.6	22.4
payment for telecommunication services	23.8	22.2	19.3
payment for the Internet	6.2	5.9	5.5
payment for training employees related to the development and use of information and communication technologies	1.0	0.6	0.5
payment for services of third-party organizations, information and communication technology specialists (other than telecommunications and training services)	17.1	20.1	20.3
other expenses	9.1	5.6	5.9

So recently there has been a trend towards lower costs associated with the acquisition of computer equipment and telecommunications equipment (a decrease is 2.1% and 1.5%, respectively). A decreased by 4.5 percent (to 19.3%) of the telecommunication services cost is registered. At the same time, in the cost structure of organizations, there was an increase in costs associated with the purchase of new software and payment for services of third-party organizations, information and communication technology specialists (an increase by 8.6% and 3.2%, respectively). The diagram of the cost structure of organizations in 2016 on the development of information and communication technologies is shown in Figure 6.

Cost structure of organizations in 2016 on the development of information and communication technologies
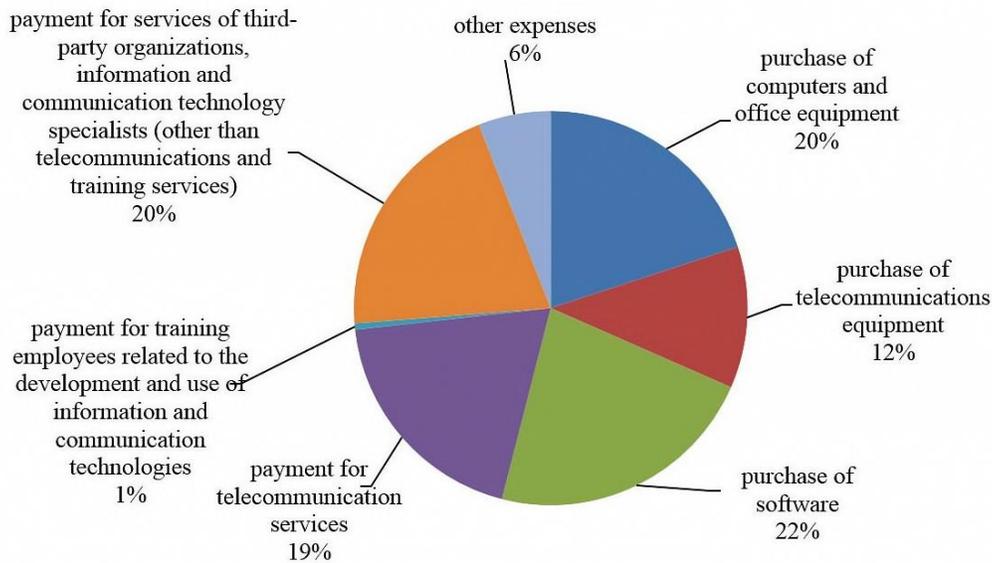
Figure 6. Cost structure of organizations in 2016 on the development of information and communication technologies

It stands to mention, according to official statistics, 87.3 percent of organizations use in their work the means of protecting information, transmitted over communication networks. About 42.9 percent of organizations use encryption tools for information transfer. Seventy-seven point seven percent of organizations use an electronic signature, which indicates the use of electronic document management systems by organizations. The usage of such systems is impossible without the electronic signatures.

Thus, on the one hand the analysis of the information technology usage by organizations confirmed the existence of differentiation between the federal districts of the Russian Federation, pointing to the problems of introducing e-commerce. On the other hand, it showed a positive trend in the use of information technology, computers and communication networks. So, the share of organizations, developing Intranet and Extranet networks, is growing. Every year, the proportion of organizations that have their own website grows, and the volume of electronic commerce increases. In the cost structure of organizations, the costs of paying for telecommunication services are reduced. Certainly, the development of organizations along the way of modern information technologies introduction and the development of e-commerce opportunities have a positive background for the formation of a full-fledged information society in Russia.

Discussion

The conducted research showed how much the information society was integrated into the daily life of the Russian population, how efficiently the population uses the opportunities of electronic commerce and e-government, and how the state and business are prepared for successful functioning in the framework of universal informatization.

In fact, the indicators of the availability of personal computers, connection to the Internet, are growing each year among households in Russia. The share of citizens using mobile devices (smartphones, mobile phones) for Internet access increases. Citizens of the country are increasingly starting to use various gadgets to enter the network, such as SMART TVs and game consoles.

It is worth noting that the "Internet" is not only in the role of an entertainment environment, it is used for financial transactions, search for vacancies. More and more often the population uses communication networks services for online purchase of goods and services. About 51.3 percent of Russian citizens, from the number of those, who use the mechanism for obtaining state and municipal services, receive the help of the government in electronic form.

It is notable that in times of intensive development of information technologies, information security indicators are improving. An increasing number of the information environment users face the problems of unauthorized distribution of information (spam), infection with viruses, and loss of information. Positive situation is with the use of information technology in organizations. The number of personal computers increases annually, including those with access to the Internet. The number of servers increases, as well as the share of organizations that have their own websites.

An increasing number of organizations choose the development of Intranet and Extranet networks, instead of local computer networks. For these purposes, information and communication technologies' cost multiplied. At the same time, whereas the positive changes in the information society of Russia in recent years, it is difficult not to pay attention to the remaining problems in the information and communication sphere.

Firstly, there is a high degree of differentiation of the federal districts of the Russian Federation in the use of information and communication technologies by both households and organizations. So, in equipping households with personal computers, the difference in the federal districts is 14.3 percentage points, for access to the Internet - 9.8 percentage points, for broadband access - 15.5 percentage points.

In addition, differentiation affects both urban and rural areas. In rural households, the saturation with personal computers and access to the Internet is 16.7 percent, which is 14.9 percent lower

than in urban areas. The overall level of household involvement in the practice of the information society in Russia remains low. A similar situation can be traced in the distribution of organizations that have personal computers and access to the Internet by federal districts. Here, the figures for differentiation are somewhat lower and are 7.0 percentage points for personal computers, 8.1 percentage points for access to the Internet.

Secondly, the analysis of various devices usage for accessing the Internet in comparison with the generalized indicator for the EU countries showed that in Russia only 48.9 percent of households use mobile devices (smart phones and mobile phones) to access the Internet. In Europe, this indicator is 76 percent. This indicates the commitment of most households to accessing the Internet from stationary computers, laptops and netbooks, which are less mobile. Mobile devices also allow to connect to the network from anywhere, wherever the user is.

Thirdly, a deterrent to the development of information technology in Russia is the reluctance of citizens to use them. For example, among households those do not have access to the Internet network in urban and rural areas, these figures were 72.2 percent and 65.1 percent, respectively. As it was said earlier, in the sphere of e-government, 69.6 percent of respondents who do not use the advantages of e-government prefer personal contacts with authorities. The same constraints are also characteristic for e-commerce: 54 percent of the population prefers to make purchases without using a virtual environment. Thirty-seven percent of the population does not see the need for electronic purchases, and 19 percent simply lack confidence in them.

Fourthly, the analysis of official statistics in the sphere of e-government shows that, despite the development and popularity of public services in electronic form, some technical issues remain unresolved. Many users observe technical failures, face outdated information that the state authorities did not update in a timely manner. Often, when technical problems occur, users are unable to obtain technical support or assistance in a timely manner. Unfortunately, detailed statistics are not available on the sites of non-state institutions, in particular on organizations involved in e-commerce.

At the same time, the Higher School of Economics publishes an indicator of one percent (Abdrakhmanova et al., 2017), related to the technical difficulties of the respondents, namely, the insufficient speed of the Internet channel when making purchases of goods and services online via the Internet. In this regard, detailed information on the technical aspects of restraining the development of e-commerce would be appropriate.

Fifthly, despite the fact that the proportion of organizations using broadband Internet is at a high level of 88.7 percent, only 45.9 percent of organizations have their own website. In other words, more than 50 percent of organizations do not have their own web page on the Internet, thereby they do not develop electronic commerce, without making it more attractive to the public.

The study showed that the target indicators of the state program "Information Society" for 2016 are being fulfilled, but the indicators of 2020 are more important, for which the program is designed. In order to analyze the implementation of the state program in 2020, we conducted a forecast of the main indicators studied in the work and their prospects for development.

The Federal Service for State Statistics observed the use of information technology, information and communication networks by the population only from 2013. In fact, the dynamic range that is possible for the study is the period 2014-2016. Basing on the three available points, it is difficult to make a reliable forecast for 4 points ahead. However, when constructing the trend, we chose a logarithmic approximation, as a more "pessimistic" scenario for the development of indicator values.

Figure 7 shows the indicators characterizing households: "Personal computers", "Internet access", "Including broadband access". The reliability value of the R^2 approximation for these indicators is more than 93 percent.
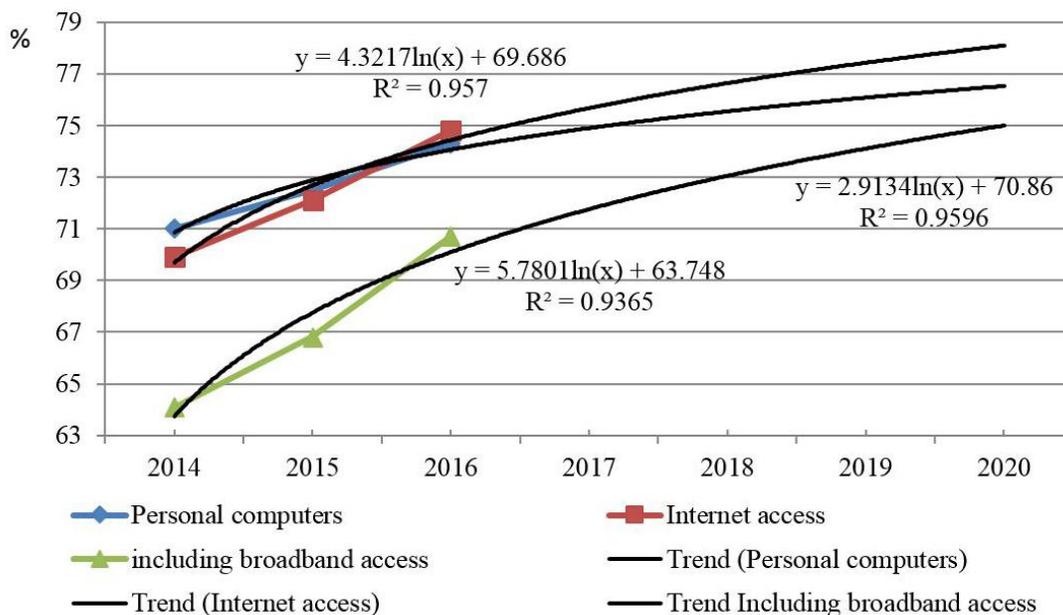
Figure 7. Forecasting the change in indicators that characterize the use of information technology by households

Figure 8 shows the indicators characterizing the participation of the population in e-government and e-commerce: "Population receiving public services in electronic form", "Population purchasing goods and services online". The reliability value of the R^2 approximation by the first indicator is 84.4 percent, due to a sharp increase in the share of the population receiving public services in electronic form in 2016, compared to 2015 (51.3% and 39.6%, respectively). The reliability of R^2 approximation according to the second indicator is 97.8 percent.

The chart shows two trend lines with equations:
- $y = 13.76\ln(x) + 33.815$, $R^2 = 0.844$
- $y = 5.3394\ln(x) + 16.811$, $R^2 = 0.9777$

Legend:
- Population receiving public services in electronic form
- Population purchasing goods and services online
- Trend population receiving public services in electronic form
- Trend population purchasing goods and services online
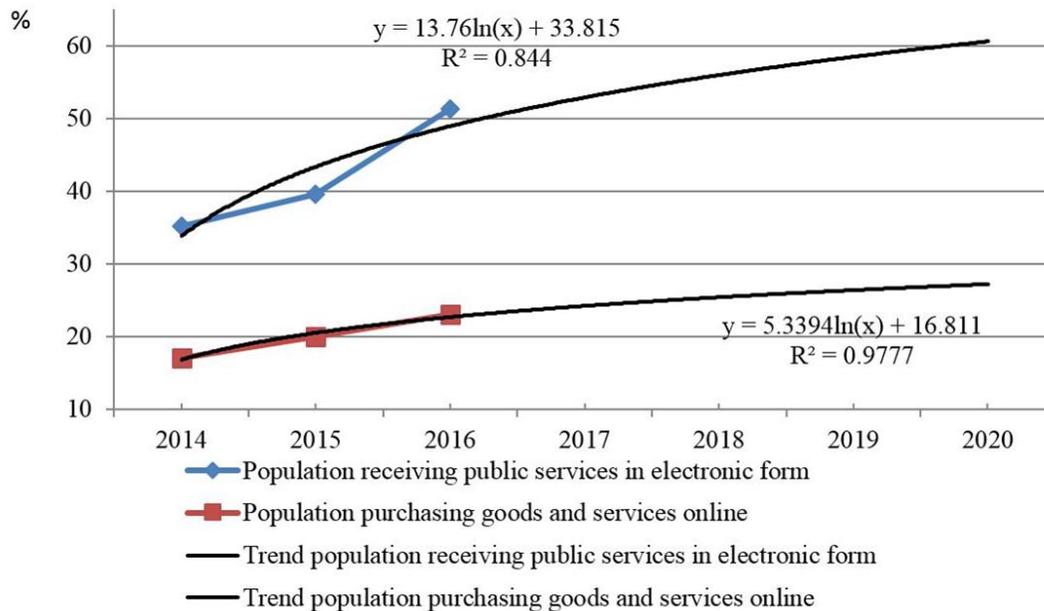
Figure 8. Forecasting the change in indicators that characterize the participation of the population in e-government and e-commerce

The calculations show that by 2020, 76.5 percent of households will have personal computers, 78 percent will have access to the Internet. Broadband access is forecasted at 75 percent of households. The share of the Russian population using the mechanism for obtaining state and municipal services in electronic form is aims at 61 percent, and the population purchasing goods and services online is 28 percent.

Let's remind that by 2020 the state program "Information Society" predicts that no less than 95 percent of the country's households will have access to the Internet. At the same time, the share of citizens, using the mechanism for obtaining state and municipal services in electronic form should be at least 70 percent (Resolution of the Government of the Russian Federation on April 15, 2014, no. 313). As can be seen, our forecasts are more modest, but they can be corrected if there is a more complete dynamic sample of these indicators. In the case of working with indicators that characterize the use of information technology by organizations, dynamic range of data is more extensive. The data are available since 2003 on the official website of Rosstat. In this connection, when constructing the trend, a polynomial approximation was chosen, as a more "reliable" scenario for the development of the indicators values.

Figure 9 shows the indicators: "The number of personal computers for 100 of employees", "The number of personal computers with "Internet" for 100 of employees," Organizations with website in Internet. The reliability value of R2 approximation for these indicators is more than 97 percent.
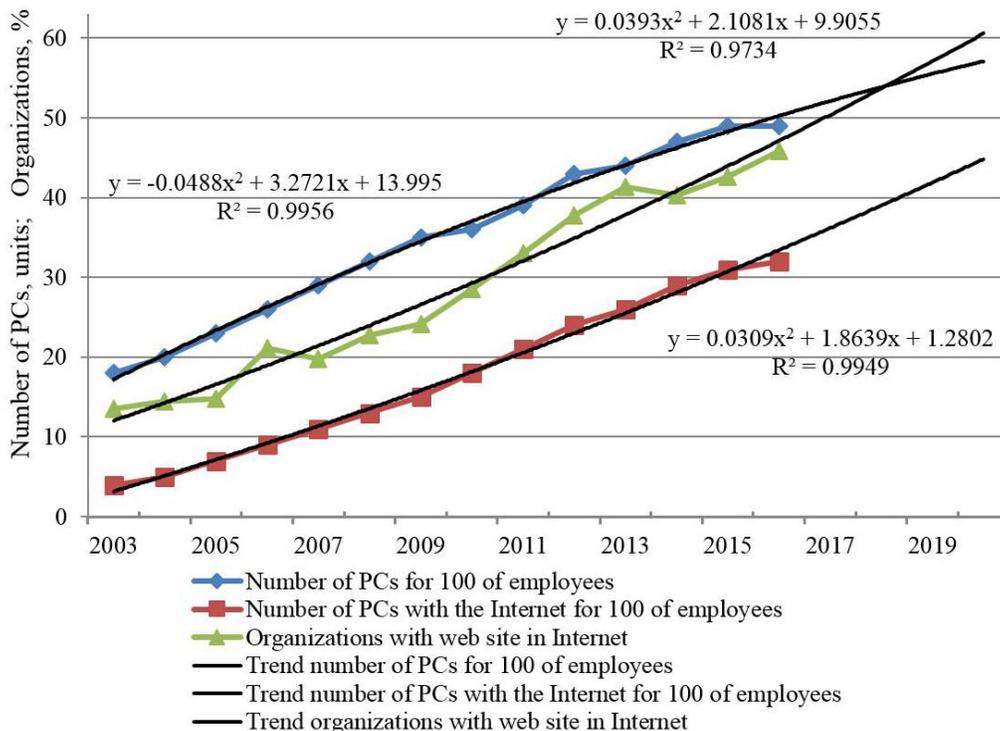
Figure 9. Forecasting the change in indicators that characterize the use of information technology by organizations

The calculations show that by 2020 there will be 58 computers for 100 employees, 45 of which will have an Internet connection. The number of websites is planned at 60.5 percent of organizations. Of course, the share of own websites should grow at a high pace with the aim to develop e-commerce. Based on the information received in the course of the study on the main problems, it seems possible to formulate the main ways to solve them.

To improve the forecast and the current level of information technologies development, computers, communication networks and their use by the population and organizations, with the purpose of realizing the available development potential, it is necessary to pay attention to the following provisions.

Firstly, to reduce the difference of the federal districts of the Russian Federation in the degree of the information technology development, paying attention to the enormous difference in the dissemination of information technology in urban and rural areas. Align differentiation to 5-6 percentage points. To date, this is the most difficult task, which requires attention from the state.

Secondly, to revise the approaches to the organization of online services, which are provided for work directly from personal computers. Develop online services that allow to perform the same functions, using mobile devices. This should promote the use of mobile devices to access the Internet and attract more people to work with both e-government and e-commerce opportunities.

Thirdly, to popularize the opportunities of the information society, the prospects for citizens from its full implementation, in order to reduce the number of people that are skeptical about modern information technologies.

Fourthly, to increase the level of technical support for all existing online services, both e-government and e-commerce. Create 24-hour call-centers, where the user can always get a detailed and understandable answer for the most uncomplicated question.

Fifthly, the trade and services organizations should strive to create their own web-sites, forming the segment of e-commerce. Obviously, the development of e-commerce is one of the key indicators for the information society development.

The processes of globalization had a profound impact on the modern world in recent decades, but at the same time, the government at the macro level and business at the micro level must meet the challenges and seek optimal solutions (Stegaroiu, 2014).

As already noted, Russia has a good potential for the development of the information society, but in many aspects, it does not reach the countries of the European Union. In this regard, the implementation of the submitted provisions should favorably affect the international ratings of Russia on the indices of the ICT Development Index, the E-Government Development Index, the Global Competitiveness Index and, as a result, should contribute to a more intensive and qualitative development of the information society.

Conclusions

The development and dissemination of information and communication technologies became one of the first global challenges of our time, dramatically changing the face of the world. Today, a high level of computer literacy of the population is one of the key conditions for the country's successful economic and social development. Improvement of information and communication technologies, knowledge and skills help to increase the efficiency of the performed work, develop communication, socialize, introduce new forms of education, provide access to various types of information and obtain services.

Skills for working with information are necessary for obtaining public services in electronic form. Citizens that are unable to work with information are forced to repeatedly visit state institutions, while the same services through the portals can be provided with the least possible expenses. Computer literacy is the main element and a necessary condition for effective interaction with the latest technologies.

Thus, technologies act as drivers of social and economic growth. For everyday life, this means the immersion in new forms of communication and consumption, starting with the daily reading of news on the Internet, online shopping and finishing with virtual interaction with public

authorities, distance learning and work.

The statistics of the information society in Russia is the newest direction of social and economic statistics, aimed at studying all aspects of activities related to the production and dissemination of information technologies, as well as their application in the economy, social sphere, public and private life. In fact, the dynamic range of data on the use of information technology, computers and communication networks by households begin in 2014.

The conducted research gave a comprehensive assessment of the national potential in the field of information and communication technologies. The work analyzed the issues of using personal computers and communication networks by households, "Internet", as well as the spread of the broadband access. It is revealed how effectively the population uses the opportunities of e-commerce and e-government and how the state and business are prepared for a successful functioning within the information society.

Analysis of these issues revealed certain problems and constraints to the formation of the Information Society factors that were systematized by the authors. In particular, the low level of use of the information society opportunities is caused by social barriers. Many respondents indicated, as reasons, reluctance to the use of these opportunities, putting personal communication at first place.

The forecasting of the basic researched indicators is conducted; their prospects of development were defined. The forecast showed that the development of some parameters did not correspond to the declared plans of the state program "Information Society". Based on the above forecast, the authors formed recommendations on increasing the scale of information technologies development, computers and communication networks in Russia. The obtained results can be useful in updating activities aimed at further development of information and communication technologies and involving the population in using new forms of interaction.

Further research in the field of the information society development would be necessary and planned by the authors. Since it was the regular monitoring that would allow to more accurately analyze the trends in the indicators characterizing the information society and its perception by the population of the country. At the same time, further studies were planned with the widening of the levels of indicators, such as the analysis of age groups, a more detailed analysis of the districts of the Russian Federation, and so on.

This research will be useful for decision-makers, sociologists, economists, researchers, teachers and students interested in the development and establishment of the information society in Russia.

References

Abdrakhmanova, G.I., Gokhberg, L.M., & Kevesh, M.A. (2017). Indicators of the digital economy. Statistical compilation. Moscow: National Research University "Higher School of Economics".

Anthopoulos Leonidas, G., & Reddick Christopher, G. (2016). Understanding electronic government research: A framework and empirical evidence. *Information Polity: The International Journal of Government & Democracy in the Information Age*, 21(1), 99-117.

Buttarelli, G. (2017). Privacy Policy: updating human rights for the digital society. *Health and Technology*, 7(4), 325-328.

Cheikhrouhou Naoufel, Tawil Abdel-Rahman, H., & Choudhary Alok (2013). Modelling competence-based virtual organizations using the unified enterprise competence modelling language. *International Journal of Production Research*, 51(7), 2138-2159.

Crawford, S. (1983). The origin and development of a concept: The information society. *Bulletin of the Medical Library Association*, 71 (4), 380-385.

Demographic Yearbook of Russia (2017). Moscow: Rosstat, p. 263.

Dolničar, V., Prevodnik, K., & Vehovar, V. (2014). Measuring the dynamics of information societies: empowering stakeholders amid the digital divide. *Information Society*, 30(3), 212-228.

Eurostat. Your key to European statistics. Retrieved March 15, 2018, from http://ec.europa.eu/eurostat/data/database

Fang Wei, Wen Xue Zhi, Zheng Yu & Zhou Ming (2017). A survey of big data security and privacy preserving. *IETE Technical Review*, 34(5), 544-560.

Global Competitiveness Index. Retrieved March 15, 2018, from http://reports.weforum.org/global-competitiveness-index-2017-2018/competitiveness-rankings/

Hilbert, M., López, P., & Vásquez, C. (2010). Information societies or "ICT equipment societies?" Measuring the digital information-processing capacity of the society in bits and bytes. *Information Society*, 26 (3), 157-178.

ICT Development Index. Retrieved March 15, 2018, from http://www.itu.int/net4/ITU-D/idi/2017/index.html

Federal State Statistics Service of the Russian Federation. Information Society. Retrieved February 20, 2018, from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/it_technology/

Irkhin, I.V. (2007). Electronic government and society. *Sociological Research*, 46(2), 77-92.

Jing, W., & Guoqiang, Y. (2018). From modernization to neoliberalism? How IT opinion leaders imagine the information society. *International Communication Gazette*, 80(1), 7-29.

Jurado-González, J., & Gómez-Barroso, J.L. (2016). What became of the information society and development? Assessing the information society's relevance in the context of economic crisis. *Information Technology for Development*, 22(3), 436-463.

Ladov, V. (2017). Skepticism in the information society. *Coactivity, Santalka*, 25(1), 38-47.

Laikam, K.E., Abdrakhmanova, G.I., Gokhberg, L.M., & Dudorova, O.Y. (2017). Information Society in the Russian Federation: statistical compilation. Moscow: Rosstat, National Research University "Higher School of Economics", p. 328 ISBN 978-5-7598-1719-2

Lolas, S.F. (2017). Technoscience and citizenship: Ethics and governance in the digital society. *Acta Bioéthica*, Vol. 23, 2, 363-364. (in Spanish)

Marsden, C. (2018). How Law and Computer Science Can Work Together to Improve the Information Society. *Communications of the ACM*, 61(1), 29-31.

Meijere, S., & Tambovceva, T. (2016). Digital tools for society development and engagement. *Economic Science for Rural Development Conference Proceedings*, April 2016, 43, 79-85.

Methodology EGDI. Retrieved March 15, 2018, from https://publicadministration.un.org/egovkb/en-us/About/Methodology

Minkkinen, M., Auffermann, B., & Heinonen, S. (2017). Framing the future of privacy: citizens' metaphors for privacy in the coming digital society. *European Journal of Futures Research*, 5(1), 1-13.

Order of the Government of the Russian Federation on November 1, 2013, No. 2036-r "On the Approval of the Strategy for the Development of the Information Technology Industry in the Russian Federation for 2014-2020 and for the future, until 2025. Retrieved March 15, 2018, from http://base.garant.ru/70498122

Pedersen, J., & Wilkinson, A. (2018). The digital society and the provision of welfare services. *International Journal of Sociology and Social Policy*. Retrieved March 15, 2018, from https://doi.org/10.1108/IJSSP-05-2017-0062

Presidential Decree on May 9, 2017, No. 203 "*On the strategy for the information society development in the Russian Federation for 2017-2030*". Retrieved March 15, 2018, from http://www.garant.ru/products/ipo/prime/doc/71570570

Resolution of the Government of the Russian Federation on April 15, 2014, No. 313 "*On the approval of the state program of the Russian Federation "Information Society (2011-2020)*". Retrieved March 15, 2018, from http://ivo.garant.ru/#/document/70644220

Resolution of the Government of the Russian Federation on January 28, 2002, No. 65 "*On the federal target program" Electronic Russia (2002-2010)*". Retrieved March 15, 2018, from http://base.garant.ru/184120/

Selective federal statistical observation on issues of population usage of information technologies, information and telecommunication networks. Retrieved March 15, 2018, from http://www.gks.ru/free_doc/new_site/business/it/fed_nabl-croc/index.html

Stegaroiu, I. (2014). The impact of globalization on diversity management. International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM2014. *SGEM2014 Conference Proceedings*, Book 2, Vol. 4, 737-744.

Sucu, A. (2017). The term of information society and its concealment of hierarchies and differences in our societies. Istanbul Aydın Üniversitesi. *Dergisi Anadolu Bil Meslek Yüksekokulu*, 45, 1-6.

Sudov, E.V., & Levin, A.I. (2002). *Concept of the development of CALS-technologies in Russian industry*. Moscow: Scientific Research Center of CALS-technologies "Applied logistics".

The ICT Development Index (IDI): Conceptual framework and methodology. Retrieved March 15, 2018, from https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017/methodology.aspx

UN. (2016). E-Government Survey 2016. Retrieved March 15, 2018, from https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016

Vania, B. (2017). Beyond the algorithmic and automated society. Towards a critical reappropriation of digital culture. *Observatorio (OBS)*, 11(3), 186-198. (in Spanish)

Wirtz, B. W. (2016). Local e-government and user satisfaction with city portals - the citizens' service preference perspective. *International Review on Public and Non-profit Marketing*, 13(3), 265-287.

Zoroja, J. (2011). Internet, e-commerce and e-government: measuring the gap between the European developed and post-communist countries. *Interdisciplinary Description of Complex Systems*, 9(2), 119-133.