SPECIFICITY OF USING PATENT INFORMATION IN DEVELOPING INFORMATION SOCIETY IN RUSSIA

Natalia Kameneva, Sergey Lebedev, Arkadiy Urinstov

***Abstract**: Article is dedicated to issues of forming information society in Russia nowadays.*

The main characteristics and challenges of modern information society are described. The development of the information systems is aimed at the control of the Russian economy. It is closely connected with the changes in the various fields of these systems' application. The transition to a civilized market economy is characterized with the changes at both: at the macroeconomic level, i.e. in the Russian economy as a whole, and at the microeconomic level, i.e. in the enterprises, organizations and institutions. Summing up all of the above, we can observe the emergence of fundamentally new economic concepts, objects, business entities, changing ranges of goods and services. On these circumstances, information systems are subject to radical changes to support economic activities.

The rapid growth and differentiation of the demand for all kinds of information, including scientific, technical, economic, financial and commercial data, as well as increasing demand for the information content and the forms of its presentation, are the dominant incentive for the development of information systems to exchange electronic data. Thanks to scientific and technological achievements and innovative process, we can see and apply new hardware and software. So-called information revolution as a consequence of scientific and technological progress of recent decades can be characterized by the emergence of the network economy and the development of the information society. International communication and implementation of information technology in the production and management processes, integration of global information networks provided the emergence of new management models aimed at the cooperation processes of economic entities operating on the basis of a global network of business interactions.

The importance of the use of patent information in developing and manufacturing innovative high-tech products and services is also stressed in this paper. The method of complex search and use of patent information is presented in the article. The technique of the work with global patent information is based on patent search on patent databases of international patent organizations and Rospatent.

Patent information, contained in the world patent databases, allows the organization to solve the basic problem of innovative activity: to determine the existing state of the art and the leading direction of innovations, to create technological innovations on the basis of the achieved technical level and to register the enterprise's ownership on new invention and innovations.

In the article the methods of conducting patent research to determine the world state of art through the use of patent databases on the websites of the Federal Institute of Industrial Property (FIPS), the European Patent Office (EPO), the World Intellectual Property Organization (WIPO) is described.

The basic components of modern information resources of the network economy are outlined. Major Russian government programs defining development strategy in the fields of information society development and innovations – the State Programme "Information Society 2020" and The Strategy of Innovative Development of the Russian Federation for the period up to 2020 "Innovative Russia – 2020" – are reviewed in this paper.

This project has been funded with support from the European Commissionduring TEMPUS ECOMMIS (www.ecommis.eu).

***Keywords**: Keywords: information society, network economy, informational resources, information technologies, innovative activity, patent information, scientific-and-engineering information, the world state of the art, research and development organizations*

Introduction

Nowadays, much attention is paid to the formation and the development of the information society in Russia. The term "information society" means a postindustrial society in which the production of information products dominates over the production of material values. Information society is a society of knowledge (including know-how), occupying the fundamental positions in all the sectors of the market economy, and the knowledge is a key factor in the development, a strategic resource, including the concentration of theoretical knowledge, information processing and analysis, intellectual capital, human intellectual abilities, people's skills, qualification and professionalism.

On enhancing the role of information in the society there were built many contemporary theories to explain the profound changes in the economic and social structures of developed countries. Information technologies have radically changed and continue to change our world. At present, without computer tools you cannot set up any modern business. An era of the information society is the one where content production occupies a dominant place. Information content can be easily distributed and it is available through using WWW, smart phones, various mobile devices, television, etc.

The necessary to respond quickly to rapidly changing economic situation and permanently changing external environment forces the companies to make regular adjustments in the existing control system for the purposes of minimizing their operating costs. These modifications lead to the necessity of the companies having available flexible tools that will ensure the rapid exchange of reliable information, so that the enterprises should adapt to new business requirements. Improving systems of any nature, including control systems economic objects, is characterized with translational evolutionary stages of development, resulting from constant occurrence and subsequent resolution of contradictions not only between the subject and the object of management, but also inside them. The development of business entities is influenced by two large groups of environmental factors: external and internal.

External factors generate contradictions arising from the interaction with the objects of the enterprise environment (banks, businesses, fiscal authorities, law enforcement agencies and others) and they can be referred to the areas reflecting these interactions (marketing, finance, sale and distributing the products, logistics, etc.). Internal factors generate a group of contradictions arising from the interaction of production sector (goods, works and services in a particular area) with the company administration and its human recourse management. Inadequate control system response to external changes or changes related to the production development or lack of production process. All this will deepen and strengthen the contradiction, which can be overcome by means of changing managerial methods and techniques.

Business development, globalization of society and its increasingly spreading computerization result in the fact that each decade we face the problems which require urgent solutions. And the appearance of new appropriate computer instruments and appliances will be the solution to these problems.

The development of the information systems of controlling Russian economy is closely connected with the changes in the various fields of their application. Transition to civilized market economy is characterized with the

changes at both: at the macroeconomic level, i.e. in the economy as a whole, and at the microeconomic level, i.e. in the enterprises, organizations and institutions. Summing up all of the above, we can observe the emergence of fundamentally new economic concepts, objects, business entities, change in the range of goods and services. On these circumstances, information systems are subject to radical changes to support business.

The rapid growth and differentiation of demand for all kinds of information, including scientific, technical, economic, financial and commercial data, as well as increasing demands for information content and forms of it presentation, are the dominant incentive for the development of information systems to exchange electronic data. Thanks to scientific and technological achievements and innovative progress, we can see and apply new hardware and software; we can observe new approaches related to the design and use of electronic data interchange between business entities as a means of decision support systems and execution control systems. All these novelties are considered necessary and sufficient conditions for survival and profitability in an increasingly competitive environment.

So-called information revolution as a consequence of scientific and technological progress of recent decades can be characterized by the emergence of the network economy and the development of the information society. International communication and implementation of information technologies in the production and management processes, integration of global information networks provided the emergence of new management models aimed at the cooperation processes of economic entities operating on the basis of a global network of business interactions.

As a result of the development of a global process of society computerization the formation of a new highly automated information space has started. The most important components of the information space in Russia are the following: the national system of scientific and technical information; scientific and technical potential; domestic and foreign documentary sources of information; reference and information resources; automated information funds and libraries of scientific and technical information; the information needs of scientists and availability of the main types of information for different specialists, scientists and experts; legislative, regulatory and methodical documents for scientific information activity, the technologies of collection, processing, storage, retrieval and transmission of information, information network technologies and the market of information products and services.

Analysis of trends in information society proves that the network economy will dominate the post-industrial society, opening up new possibilities in the development of the civilization.

In Russia the network economy is gaining its strength, because there is a mass market of information services.

This market includes distance learning, numerous information services, making payments, tickets, insurance, billing, paying utilities, e-commerce, etc.

One promising direction, which ensures equitable development of our country's entrance into the global information market, is a further development of the national system of patent information and its further inclusion in the global patent system in compliance with all current relevant international regulations and standards. At present Rospatent has already implemented and actively uses modern information technologies, which provide not only the formation of full-text databases of patent information, but also efficient search of the patent information on different attributes.

Discussion and Results of Research

In Russia, in October 2010 the State Programme "Information Society 2020" was developed [1]. In this program the emphasis was made not only on the information media, but also on the possibility of delivery of the

information with the help of these instruments. The purpose of this state program is to ensure the country's technological breakthrough in the use of information. Under the state program primary objectives of electronic government in the Russian Federation are as follows:

1. Ensuring a single information space;
2. Providing a safe and automated access to information;
3. Rapid response to the growing needs of individuals and organizations;
4. Improving the efficiency of staff in ministries and departments;
5. Supporting the implementation of the resolutions and decisions of the government;
6. Provision of reliable and user-friendly interface for collaborative work;
7. Ensuring the security and confidentiality of information;
8. Minimizing overhead.

Development of information society creates the conditions for innovation processes of globalization, but so far these processes have remained local in essence.

The Strategy of Innovative Development of the Russian Federation for the period up to 2020 "Innovative Russia – 2020" (Ministry of Economic Development Project Government Decree № 2227-p) was adopted by the Russian government In December 2011. The purpose of this strategy is to provide the population with the high level of wealth and to strengthen the country's geopolitical role. The only way to achieve these goals is to transform the economic model into an innovative and socially - oriented one. According to this strategy quantitative economic indicators for 2020 are to be the following: the market share of high-tech products should reach 5-10%, a rise in the proportion of high-tech sector of GDP from 10.9 % to 17-20%, an increase of the innovative products in the manufacturing output by five – six times, the growth of the number of research and development organizations from 9.4 % to 40-50 % [2].

To ensure the growth of innovations and economic performance in these industrial sectors, or at least to keep them at a fixed level it is necessary to conduct scientific research and inventive activity in the industrial enterprises by developing technological innovations and through supporting, completing, replenishing, updating one of the most important intangible components of the business – patent resources: protective documents on inventions, industrial designs, utility models, trademarks etc.

Scientific-and-engineering information, contained in international patent funds, allows determining the world state of the art, to register and secure the exclusive patent rights to the innovations by the company. Patent information is characterized with laconicism and brevity of the technical solution statement is the claim; informative completeness as a claim of the invention includes the necessary and sufficient signs for implementing technical solution; determinacy as the signs entered into a claim of the invention doesn't allow any other interpretation.

Only with the help of patent information the technical level of industrial goods and the novelty of developed products and technologies can be surely established. As the main source of information provision of innovation, 70% of patent resources contain unique and precise information, which is not published in other sources [9]. **Figure 1** shows the scheme of obtaining patent information in Russia by means of using various Russian and international databases and abstract journals that can help to investigate the world state of art in a given technological field.

The main resources of patent information are described in detail in the sources [5, 8, 9, 10, 11, 12]. Using the above sources of patent information in Russia based on a variety of domestic and international databases and

referred publications, researchers and developers can define the overall level of development that means the world state of the art.

To handle this information the International Patent Classification (IPC) was established in 1971.

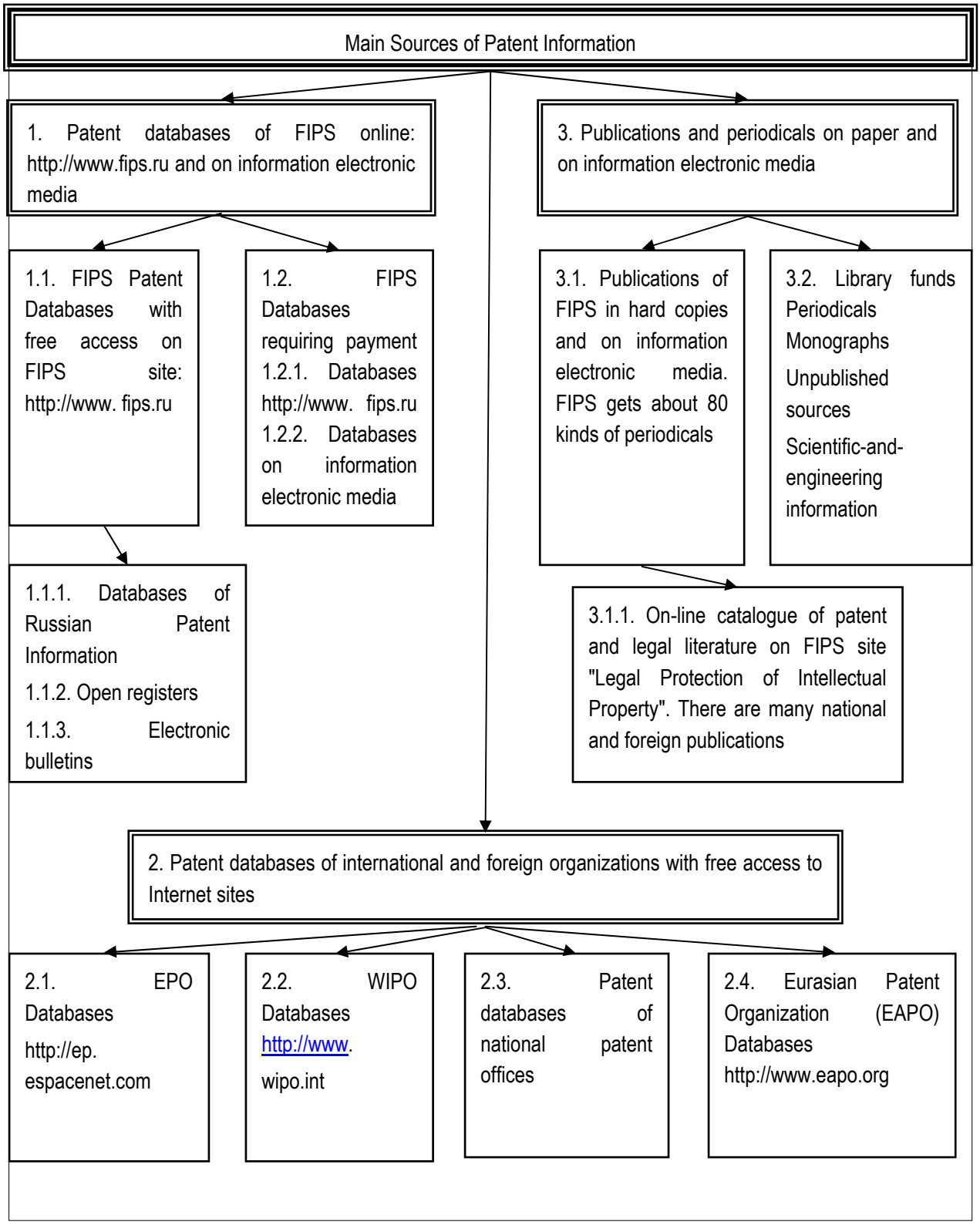

Figure 1. Main Sources of Patent Information

It provides for a hierarchical hand-built system of symbols for the classification of patents and utility models in a standardized international format according to the different areas of technology to which they pertain.

IPC has been continuously revised and updated due to new technological areas appearance. IPC is a mean of obtaining timely and accurate information. Learning at least one patent analog and not knowing a particular foreign language it is almost possible to determine the content of the patent, the key word in any foreign language and to select patent analog samples.

The complexity of the world patent information is accounted for its huge amount, of continuous renewability, the absence of unified world patent databases, many sources of information collection, language barriers, the diversity of patent resources structures and their search engines that result in problems of retrieving patent documents. All these factors stipulate high requirements for qualification of the specialists engaged in patent any activity.

By the IPC rubrics the data on the studied matter and on the countries of interests are quickly elicited.

Patent research is the investigation of the state of art and trends in developing technical objects, their patentability, patents' validity, competitiveness, based on patent and other scientific or legal information. Search on the definition of prior art or information retrieval should determine the currently attained level of development in a particular technological activity to prevent groundless costs on research and development of the inventions that are already known. There are the following search types: thematic-by using keywords and the IPC indices, nominal (corporate) - by the name and surname of the inventor, the applicant or patent owner; numeric – by the registration numbers of patent documents.

The department of Rospatent – Federal Institute of Industrial Property (in Russian: Federal Institute of Promyshlennya Sobstvennist or FIPS) provides protection of legal rights to intellectual property objects, examines applications for patent rights, grants protective documents and keeps public registers of the Russian Federation for inventions. Using the Rospatent information resources, any company conduct a patent search to determine the technical level in a given field of the technological innovations development.

Determining the required patent classification symbols can be done with the help of Alphabetical Subject Index (ASP) to the IPC and the IPC on the site of FIPS and WIPO. Thematic search on the selected keywords is conducted on the abstract of the invention, through selecting the relevant documents. The proposed method and algorithm for integrated search and use of patent information by the company to determine the state of art in the patent resources is illustrated in the diagram shown in **Figure 2**.

On the basis of principles of the IPC, we can conclude that it is an effective instrument for the orderly storage, a quick search of patent documents and determine the state of the art organization in their area of expertise in the development of technological innovations.

The implementation of the algorithm comes to the following procedure (see Figure 2**)**:

1. Analysis of the external environment. Specification of requirements for technological innovation – new products, services, production processes and production methods, which should meet the criteria of novelty, focus on the demand and potential profitability for the enterprise.

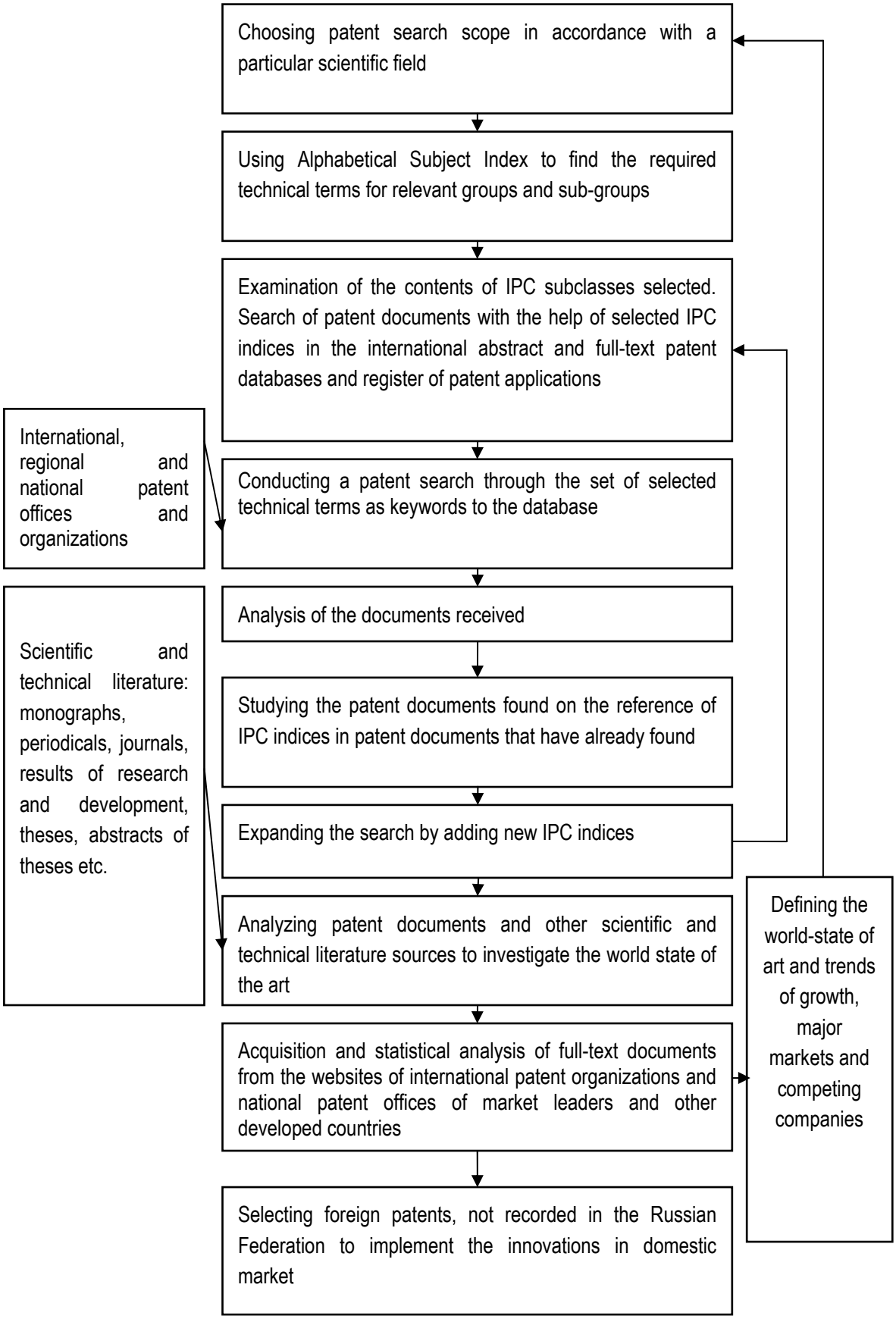

Figure 2. The method of complex search and use of patent information

2. Establish the subject of the search – the technical field, technical objects and special terms to define this technical field more broadly.

2.1. For the selection of terms related to the technical object, use the ASI to the IPC. With the ASI you are to find the group and the subdivision of the IPC. After selecting the division you are to find a suitable group, subgroup and the full classification index of the invention.

2.2. An alternative method of finding the right classification index is the search for full text and abstracts of patent documents using key words – selected technical terms. Conduct a statistical analysis of classification indices of documents found, select the most common indices of the IPC and include them in the search of subclasses.

3. Conduct the retrieval using the IPC indices and analysis of obtained documents.

4. Repeated search on related IPC rubrics in the links of patent documents already found, and obtaining search results.

5. Careful study of the description of the claims of patent documents.

6. A generalization of the results and assessment of the state of art.

If a patent search on the database of registered industrial property does not yield any results, it is necessary to continue retrieving databases of applications for the grant of patents. While investigating the technological activities of main competitors introducing new products, technology and services into the world market it is prerequisite to implement relevant patent search for industrial property objects in selected countries – developed countries and market leaders on the sites of their national patent offices, containing the largest number of inventions in appropriate languages.

Descriptions of the inventions and their brief pointer are contained in the database "Inventions of the World Countries" on optical disks and other electronic media. Database, created by Rospatent on the bases of these resources, contains more than six million patent documents. Search engine of Russian Internet segment esp@cenet provides access from Rospatent site to the sixty million European Patent Office documents from 76 countries worldwide. The state of art can also be obtained through examining printed scientific and technical literature [8, 9].With the help of IPC one can quickly find the patent materials on the topic and the country of someone's interest. Using of Rospatent information search engine on the site http://www1.fips.ru it is possible to retrieve and review the abstracts and the full-text patent documents in the Russian and the English languages. The databases and search engine structures stipulates the search on text fields, numbers and dates.

Conclusion

The economy of any country is becoming increasingly dependent not only on exports and imports of goods and services, but also on the inflow or outflow of the financial capitals. Development of transnational corporations accelerates the worldwide distribution of new production and management technologies. Contemporary technologies appear in the highly industrialized countries where in highly competitive environment the technologies are continuously updated and the markets gets more and more new products with improved characteristics. Recently introduced technologies quickly become obsolete not only in quality but also in terms of price, so only constant adaptation to market changes, the use of the latest achievements of science and technology allows the subjects of the economy to ensure their sustainable existence and development.

It is well known, that the characteristic features of the information society development are:

1. Settling the problem of information crisis;

2. Priority of the information resource compared to other types of resources;

3. The emergence of the information economy;

4. The global nature of the information technologies distribution;

5. Automating the formation of collective knowledge;

6. The availability of free access of any person to the collective knowledge through the application of information technologies;

7. An increase the proportion of self-employment in social production through the adoption of network technologies;

8. New opportunities off-line learning and its individualization, and on-line or distant learning.

All the above suggests that in the nearest future economic entities will have to constantly monitor and quickly adjust its activities to the formation and development of the information society to provide adaptability of the economic subject to permanent changes in the business. It is already noticeable, that those companies, which pursue sound marketing and pricing policies, constantly introduce different innovations - new products, technologies, customer service forms, forms of work organization, production and management, etc. These processes are most relevant to economic subjects related with high-tech solutions and productions.

In terms of financial instability, stiff competition, declining profitability of production operations and other factors, that characterize modern universal variability in business, economic entities have to be able to quickly adapt to these changes. Abundance of significant organizational factors and trivial situations makes problematic natural resolution of the problems. Modern markets, technologies, consumer demands are changing so rapidly that in these conditions the control mechanism, which is acting on the old, largely bureaucratic foundations, has already lost its ability to control efficiency adequately. The management cannot provide the necessary continuity to adjust production, technology, marketing and market policy to produce and promote the best-selling competitive products.

An information system can be regarded as a model enterprise in economic terms, the restructuring of the management system, redesign of business reorganization of material, financial and information flows, aimed at simplifying business processes in economic subjects, their organizational structure, the redistribution and minimization of resources, reducing the terms to meet the customers' needs, improving the quality of the customers' services are required separate consideration. Automation of business processes within the current information system only leads to their acceleration but it cannot ensure that multiple efficiency improvements that need in a changing business environment. Among these changes are unstable economic conditions, changes in market segments, development of high-tech technology and manufacture etc.

We are interested in the information system, which can provide support for the transformation of the control system, consisting of redesigning existing business processes and creating new management to improve efficiency. We do not consider the system, providing a better automation for existing business processes with all their defects. The term "redesign" or "reengineering" should be understood to change the existing logic links between the various components of the system control and integration of separate business processes. This ensures an optimal distribution and elimination of unnecessary connections and functions performed in accordance with the existing organizational structure of management, as well as the introduction of new processes associated with the emergence of adaptive decisions based on information technologies, what allows radically changing the basic rules for the subject of the economy or economic entities.

In the process of transformation of the system restoring the integrity of management control processes is achieved. As a result several working procedures will be combined into one, i.e. at each workplace, and the

employees will perform various simple tasks. Operating procedures are put together into larger and more complex one, and consequently, there is horizontal compression of the process.

Ongoing validation and harmonization of control actions are not directly generate income and do not produce values, so the aim of re-organization and re-engineering is to minimize the audit control actions and approvals to economically viable by reducing the level of external contact points. As we stated above, the business processes of the subject of the economy saturated with similar stages, the only purpose of which is monitor compliance with the prescribed rules. Based on restructuring management system of a particular area, instead of checks on each of the available jobs, redesigned process combines these tasks and performs verification and control actions in a certain mode, which reduces the time and the cost of performing the process. This will ensure a more efficient distribution of work between the boundaries of the units that will increase the efficiency of the whole process.

The level of development of adaptive decisions based on information technologies allows the use of modern information systems such as instrumentation. And since we can discuss the proportional relationship between the information system of the economic subject and how business is organized in this economic subject, the information system should be considered as follows. On the one hand - as the basis or the key that provides the subject of the economy to adapt to new business requirements, providing support for the transferring the existing control system to the desired state, as appropriate, the transformation of business processes of economic subjects. On the other hand - as a function of business development and a means to support economic subjects.

For these purposes, more suitable are support system formation, and control the execution of decisions because they belong to a class of information systems, which are to the sets of tools that support decision-making process.

Russia's entrance into the international information society necessitates the development of the information sector of society, which is an integral part of financial, commercial, scientific, technical and patent information. Patent information can be used not only to determine the achieved level of technology and the world state of the art, but also to develop technological innovation based on this level. Patent information is also indispensable for the analysis of the competitive activities of the companies in the market their areas of interest, identifying market leaders with their brands, monitoring the commercial activities of the firms, as well as for conducting various marketing research.

Today only about 9% percent of all Russian enterprises and organizations develop technological innovations that mean, they can be called research and development organizations [3].

Nevertheless, it should be noted that recently in Russia a stable attitude to the information as a valuable resource has already formed.

The recent intellectualization of the domestic economy, the development of innovative business and integration Russian economy into the world economy sharply increased the demand for patent information and documentation concentrated at national, public scientific and technical libraries and other patent information centers. Organization of the work of patent departments of the library and other information centers is to meet new requirements and modern patent policy is changing the strategy and tactics of modern management according to relevant and important information resource, including contemporary patent information.

Patent information has several advantages compared with other types of scientific and technical information: it is characterized by novelty, uniqueness, efficiency, reliability, and versatility, structuring, ordering, what greatly facilitates the procedure for working with her. Currently, there is a transition to an interactive or on-line way of representing objects of industrial property in various international and national organizations and patent offices. Due to lack of a unified date base of patent information it is strongly recommended to select the most significant patent databases on the websites of national and international patent offices and organizations, the integrated

use of a variety of domestic, foreign and international databases, differ in structure and the search system options. Professional knowledge of technology with patent information can dramatically reduce the company's costs on development and innovations, as well as possible risks.

Patent data bases are needed for scientific research, development and innovation strategy adjustments and scientific-technical policy of the organization: the development of technical innovations and their registration, application for receiving patents documents, familiarizing with domestic and foreign experience in the field of intellectual activity, identification of prospects for the acquisition of industrial property rights and their competitiveness, market promotion of new technical objects, facilities and equipment and insurance of their patent clearance, novelty and non-infringement.

Patents are the first publication that may indicate the possible marketing plan of the competitor. In case of conducting market research and monitoring the emergence of new technologies and manufacturers, patent resources are the most complete and reliable source of information. Analysis of patent documents and trademarks allows researching the external environment: to identify competitors; to determine the main directions of their activity; find out what new markets and the country the competing companies are going to come out with new technologies, goods and services.

Bibliography

State Programme of the Russian Federation "Information Society (2011 - 2020 years)" (approved by the Federal Government on October 20, 2010 № 1815-p decree)

Strategy of Innovative Development of the Russian Federation for the period up to 2020 "Innovative Russia – 2020" (adopted 8th December 2011 by the Russian Government Regulation NQ 2227-p). http://www.miiris.ru/docs/rtf/strateg_innov_2020.pdf.

Russia in Figures. 2013: Statistical Handbook/Rosstat. Moscow: Rosstat, 202.

Innovative Development: Economy, Intellectual Resources, Knowledge Management / ed. B.Z. Milner (2013). Moscow: INFRA-M.

Kameneva N.A. (2009). Informatsionnye resursy innovatsionnoy deyatelnosti [Information provision of innovative activity] RISK: *resursy, informatsia, snabzhenie, conkurentsia [RISK: Resources, information, supply, competition].* 2, 118-122.

Seletkov S.N., Dneprovskaya N.V. (2011). Information and Knowledge Management in the Company: Textbook. Moscow: Infra-M.

Pavlekovskaya, I.V. (2007) 'The use of social network analysis in modeling the organizational processes of information and knowledge circulation' Automatic documentation and mathematical linguistics Vol.41, No.2, New York, Allerton Press, Inc.

http://worldwide.espacenet.com/

http://ru.espacenet.com/

http://www.eapo.org/en/

http://www1.fips.ru

http://www.wipo.int/portal/en/

Authors' Information

Urintsov Arkadiy Ilich *– Professor, Doctor of Science, the Head of the Department of Knowledge Management and Information Technologies Management at the Institute of Computer Technologies of Moscow State University of Economics, Statistics and Informatics (MESI). Dr. Urintsov is a member of Coordinating Council for Information Society Development and Electronic Government of Komi Republic, the Russian Federation. Dr. Urintsov is the author of more than 300 scientific papers and practical textbooks and publications dedicated to the problems of complex business automation, instrumental methods of economic systems adaptation and implementation, decision support systems and execution control systems as the tools for the business effectiveness management, knowledge management systems and IT audit. Among Dr. Unintsov's publications there are about 200 scientific articles, 8 monographs, including 2 monographs approved by the Russian Ministry of Education and Science, and also 15 textbooks and practical manuals recommended Russian Association for Education as a methodical tutorial. Mailing address: 119501, Russia, Moscow city, Nezhinskaya st. 7;*

e-mail: AUrintsoff@mesi.ru

Major Fields of Scientific Research: Computer science, computer technology, computer information systems, information society development, global education, business effectiveness management, knowledge management systems

Kameneva Natalia Alexandrovna *– PhD, Associate Professor of the Department of Foreign Languages, Institute of Law of Moscow State University of Economics, Statistics and Informatics. The author of five published textbooks and practical manuals, two monographs, more than forty scientific articles. Mailing address: 119501, Russia, Moscow city, Nezhinskaya st. 7;*

e-mail: NKameneva@mesi.ru

Major Fields of Scientific Research: Information technologies, Information society development, Information resources, Innovative economy, Linguistics, Foreign languages teaching

Lebedev Sergey Arkadyevich *– PhD, the Dean, Institute of Computer Technologies, Moscow State University of Economics, Statistics and Informatics, mailing address: 119501, Russia, Moscow city, Nezhinskaya st. 7; e-mail: salebedev@mesi.ru*

Major Fields of Scientific Research: Computer science, computer technology, computer information systems, information society development, global education, standardization of types of professional activity