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Enhancement of Academic Research Activity in Higher Education Institutions with the Usage of Foresight Methodology

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ABSTRACT

Applicability of this paper is determined by a number of factors: Fragmentary nature of the topic of foresight in higher education institutions (HEIs), often weak connection between research projects in various departments and divisions in universities, insufficient degree of commercialization of academic research projects, lack of foundation for formulation of academic priority subject fields. Foresight methodology makes it possible to gather data necessary for making decisions on current state and directions of research; keep track of projects that are of interest to government bodies and business structures, as well as determine necessary resources for allocation in order to achieve leading positions. With this in mind, it is possible for a HEI to formulate scenarios and execution stages of "foresight" program and define offer-projects for funding from both state-financed and off-budget sources. The intended effect from foresight program implementation is to assure significant increase in revenue side of academic research projects. Thus, this paper focuses on establishing the connection between formulation of academic research policy and the end results of foresight usage in a specific subject area.

Keywords: Foresight Methodology, Academic Research, Development
JEL Classification: O21

1. INTRODUCTION

Academic research activity in higher education institutions (HEI) is understood as interaction process between intellectual potential of creative teams in an institution and material, technical, informational, organizational, financial and other factors in interdependent processes (academic research, R&D, commercialization) aimed at innovation creation, its implementation into practice and ensuring their practicality and economic efficiency (Safonova and Erusheva, 2009).

Academic research in HEIs can be viewed from two perspectives:

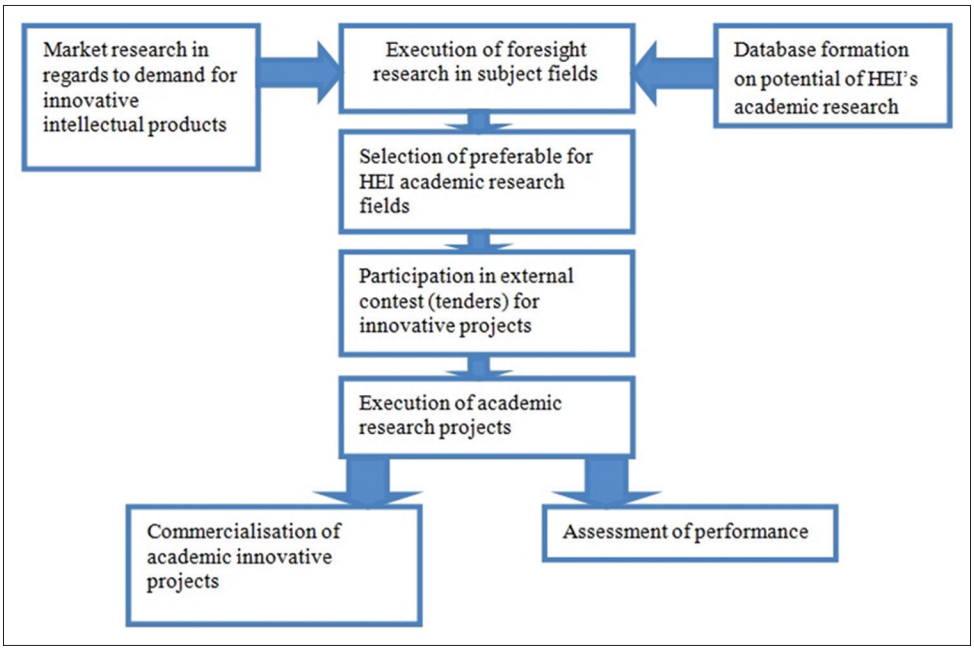
- As combination of processes that describe institution's core business areas (academic research "as is");
- As independent business area with the goal of execution of innovative projects (academic research as "project").

If academic research in HEIs were to be examined separately, it could be considered in the framework of selecting priority directions of research, project development and its realization – all in accordance with goals set by the HEI. In this relation, key aspect of academic research is 'order receipt' from external parties and then supply of innovative products in demand in the market (Gafforova et al., 2010).

Therefore, academic research in universities must be based on the interaction between the HEI and academic trends in research fields, government bodies, business communities (investors, producers, consumers), or in other words, based on the foresight research (Figure 1).

Therefore, evolution of academic research in the context of constant environmental changes in the subject fields is possible in case when HEIs are becoming foresight organizations, i.e. self-adapting organizations capable of factoring in changes in academic environment. A foresight organization develops due to the continuous process of staff training through its personal and professional growth and actively generates and utilizes state-of-

Figure 1: Academic R&D in higher education institutions in the framework of foresight application to various academic subject fields on regular basis



the-art knowledge in order to calculate alternative directions for future expansion (Epifanova, 2011).

2. FORESIGHT APPLICATION IN ACADEMIC RESEARCH IN HEIS

Foresight application has the potential to benefit HEIs in a number of ways which are examined in the term's definition, features and scope of the tasks below.

Foresight normally starts with scanning to determine what is changing and why by anticipating plausible sources and origins of change, and seeking to understand the multiple complex interdependencies that motivate personal adaptation, organizational positioning — the capacity for adjustment, and societal evolution at a more macro level (Calof et al., 2015).

According to Cuhls (1998), the most important objectives of a foresight research are:

- To enlarge the choice of opportunities, to set priorities and to assess impacts and chances;
- To prospect for the impacts of current research and technology policy;
- To ascertain new needs, new demands and new possibilities as well as new ideas;
- To focus selectively on economic, technological, social and ecological areas as well as to start; monitoring and detailed research in these fields;
- To define desirable and undesirable futures and;
- To start and stimulate continuous discussion processes.

Heger and Boman (2014) state that foresight is commonly described as activities for scanning, sensing, interpreting, and utilizing internal and external signals for change. Further, the preparation for adequate organizational adaptations, the development of preparatory strategies to meet the challenges or even to influence the environment in a favorable way are part of foresight research.

Keenan and Miles (2001) define foresight as "a systematic participation-based process of building a medium- and long-term vision aimed at present decisions, and putting forth common actions."

Works of Martin (UNIDO Technology Foresight Manual Organization and Methods Volume 1), Coates (1985), Cuhls (2003) are practically fundamental for Russian supporters of foresight methodology.

Martin (UNIDO Technology Foresight Manual Organization and Methods Volume 1) defines "(technology) foresight as the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging of generic technologies likely to yield the greatest economic and social benefits."

Coates (1985) provides another definition: "Foresight is the overall process of creating an understanding and appreciation of information generated by looking ahead. Foresight includes qualitative and quantitative means for monitoring clues and indicators of evolving trends and developments and is best and most useful when directly linked to the analysis of policy implications. Foresight prepares us to meet the needs and opportunities of the future. Foresight in government cannot define policy, but it can help condition policies to be more appropriate, more flexible, and more robust in their implementation, as times and circumstances change. Foresight is, therefore, closely tied to planning. It is not planning – merely a step in planning."

Cuhls (2003) specifically mentions that "foresight is not planning, but foresight results provide 'information' about the future and are therefore one step in the planning and preparation of decisions."

Van der Meulen et al. (2003) share Cuhls opinion in that "foresight is more than prognosis or prediction." It "holds the promise of managing uncertainty through intensive interaction between stakeholders."

Fink and Schlake (2000) in the framework of their paper suggest that foresight makes it possible to not only predict future scenarios but also to attempt to manage them while utilizing "the tool of Scenario Management for strategic foresight activities."

Moreover, Cuhls (2003) concludes that foresight methodology is not fixed and is used most efficiently when combining a number of various methods and tools. He highlights several outstanding features of foresight methodology:

- Basic points, needs, research questions are still open and looked for as part of the foresight process;
- More qualitative than quantitative;
- Looks for "information" about the future for priority-setting;
- Brings people together for discussions about the future and for networking, makes use of the distributed intelligence;
- Criteria for assessments and preparation for decisions;
- Communication about the future as an objective;
- Long-, medium- and short-term orientation with implications for today;
- Finds out if there is consensus on themes;
- "Experts" and other participants, very dependent on opinions.

Therefore, foresight fulfills at least three fundamental roles – it allows to explore new business fields (strategist role), increase the number of innovation concepts and ideas (initiator role) and increase the quality of the output of innovation projects (opponent role) (Rohrbeck and Gemünden, 2011).

Several authors agree on the above mentioned foresight roles. For instance, Vecchiato and Roveda (2010) in regards to strategic component of foresight mention that "foresight systems have been highlighted as a means for identifying drivers of change to handle the effect and response uncertainty through 'betting' on discontinuities, or more often creation of strategic options."

Burt (2010) draws attention to one of foresight valuable qualities in that it "enables organizations to learn the future faster, from problem exploration to problem resolution and action."

Another definition is provided by The European Commission's Joint Research Centre[1]: "Foresight is a systematic, participatory, future-intelligence-gathering and medium- to long-term vision-building process aimed at present-day decisions and mobilizing joint anticipatory-preparatory actions."

Calof et al. (2015) state that "foresight involves constructively bringing awareness of long-term challenges and opportunities into more immediate decision-making." This is why foresight can be characterized as policy-oriented and policy-formulating e.g. directed "to raise awareness among policy-makers, politicians and the general public about alternative perspectives on future needs and the implications hereof for present-day actions" (Van Asselt et al., 2010).

Foresight's influence on sci-tech policy formation both in case of specific companies and a country on the whole is indisputable and it is often represented in the format of technological forecasting. Technological forecasts in such countries as China (Science and Technology in China: Roadmap for 2050), France (Technologies Clés 2015), Japan (9th Japanese Science and Technology Forecast), the Great Britain (Technology and Innovation Futures), the USA (Reports of President's Council of Advisors on Science and Technology), European Union (Key Enabling Technologies, KET) are diverse but have several essential similarities in regards to energetic, public health service and medicine, foodservice industry, biotechnologies and life sciences, nano and micro system technologies (Zweck et al., 2014).

The rising need for foresight in higher education (HE) is driven by the wave of recent changes in HEIs. A number of authors point at the need and increasing requirements for advanced research (Gül et al., 2010), (Stanca, 2004), as well as higher expectations of innovation and creativity along with education and research (Kafatos, 2008).

As Cabral and Huet (2011) stated, "nowadays, HE faces a wide range of challenges associated with the arrival of new managerialim and its audit cultures. The major topics of discussion include the definition of the nature and purpose of HE and the status and role of research in the modern university, the processes of globalization and internationalization, the influence of government policy and, particularly, the national systems of funding, research assessment, teaching quality evaluation and the impact of these on the governance and management of HE."

The necessity of using foresight methodology in education was acknowledged in the project by the UNESCO Institute for Information Technologies in Education in collaboration with the HE Sector at UNESCO Headquarters "Access, Equity and Quality." The goal of the project is to contribute to shaping education policies based on research and foresight studies conducted by UNESCO in collaboration with its partner-institutions: EDUCAUSE, International Council for Open and Distance Education, the International Federation for Information Processing, New Media Consortium (NMC), Skoltech, universities from Australia, Brazil, China, Korea, South Africa, UAE, etc.[2]. Moreover, several countries had their ministries of science and education create specialized foresight departments, such as the Unit of Foresight and Horizon Scanning of the Netherlands Ministry of Education, Culture and Science[3].

1 For-Learn (2014) Excerpt from online foresight guide. Available from: http://forlearn.jrc.ec.europa.eu/guide/9_key-terms/foresight.htm.

2 UNESCO Institute for Information Technologies in Education. Access, Equity and Quality: Envisioning the Sustainable Future of Postsecondary Education in a Digital Age. Available from: http://iite.unesco.org/foresight/.

3 International Conference Moscow, 14-15 October "New Challenges for Pedagogy and Quality Education: MOOCs, Clouds and Mobiles." Available from: http://conference2014.iite.unesco.org/victor-van-rij/).

It could be argued that the global goal of research activity aimed at implementation of a HEI's mission and objectives is to organize research activity efficiently so that it is focused on the creation of innovative products in demand on the market with rational usage of resources provided by the institution. Among those objectives tied to development of academic research it is possible to highlight economic goals – increase in volume of innovative scientific products and revenue growth from their commercialization, advantageous price strategy, profit maximization from academic research projects; market goals – increase in market outlets diversification, enlargement of consumer segment, social goals etc. (Ilyshev et al., 2005). Foresight therefore is indeed a very powerful tool when it comes to raising effectiveness of a particular HEI's academic research.

Evidently, ceaseless foresight must be a part of the academic research in HEIs as it provides long-term forecasting in priority subject fields and helps transition prognosis results into actual tasks for researchers and developers.

3. PRACTICE IN THE APPLICATION OF FORESIGHT IN RUSSIAN HEIS

Currently in the Russian Federation there emerges a number of institutions that provide prognostic and analytic support for key sci-tech projects and lines of development on all levels.

In 2011 a network of leading Russian HEIs were created with the purpose of formation of the industrial expertise centers for sci-tech development prognosis:

- Saint Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO University) – industry expertise center for tracking sci-tech development in the priority area "Information Telecommunications Systems;"
- Moscow Institute of Physics and Technology (MIPT (SU)) – industry expertise center for tracking sci-tech development in the priority area "Nanosystem Industry;"
- Siberian State Medical University – industry expertise center for tracking sci-tech development in the priority area "Life Sciences;"
- National Research Nuclear University Moscow Engineering Physics Institute – industry expertise center for tracking sci-tech development in the priority area "Energy Efficiency and Saving;"
- Moscow State Aviation Technological University (MATI) – industry expertise center for tracking sci-tech development in the priority area 'Transportation and Space Systems'[4];
- Lomonosov Moscow State University (Geography Faculty) – industry expertise center for tracking sci-tech development in the priority area "Rational Usage of Natural Resources."

One of the examples of forming a separate foresight department in Russian HEIs is the Center of Sci-Tech Foresight (subsidiary of ITMO University) the main goal of which is to provide the vision of the future demand for new technologies and emerging fields of their application. Another foresight HEI division worth mentioning is the Center of Strategic Research and Development created within Siberian Federal University. However, the most prominent center that won both national and international renown is the Foresight Center of National Research University - Higher School of Economics.

Thus, it can be concluded that prognosis and forecasting are slowly developing in Russian HEIs, mostly in the framework of national research universities, which makes it possible to increase their competitive ability on the global market of academic research.

Application of foresight methodology in HEIs in particular in regards to specific subject fields can be considered as participatory foresight e.g. "as stakeholder participation in one or several steps of a policy-oriented foresight process: In the development of narratives of the future; in assessment activities to identify impacts, trade-offs and synergies; and in the formulation of suggestions for short-term policy action" (Kunseler et al., 2015). The stakeholders of the process are, first and foremost, management and HE teaching personnel, academic community at large, and management of business structures.

In this paper we consider an example of foresight research in a particular subject field "development of management theory and technology" which is one of the most sought-after program tracks in the country's HEIs. Through this case the process of foresight program formulation, algorithm and achieved results are presented and examined.

4. RESEARCH OBJECTIVES

Considering the above mentioned, the main objective is to develop foresight research methodology to apply to a particular subject area - "development of management theory and technology." This is done in order to determine the most promising directions for further research as well as best alternatives of R&D commercialization, while simultaneously considering national long-term priority directions of academic and HE advancing and strengthening of the HEI's positions in ratings (especially in those areas connected to research activity). To achieve the task in hand, following goals were established:

1. Review of theoretical basis of foresight as instrument to refine HEIs' scientific research activity.
2. Development of database "Scientific Research Works on Management (Management of Organization) in the Territory of the Russian Federation for the Period of 2010-2014" in following segments:
    - Thesis works completed by Russian post-graduate students (lines of research: Management, enterprise management, management of organization);
    - Database of approved projects of Russian humanitarian academic fund in the sphere of management;
    - Database of approved projects of Russian fund of fundamental research in the sphere of management;
    - Publications by Russian authors in journals and other titles indexed in web of Science in all fields (search field: Management) as well as economical and sociological fields;

4 As of March 2015, MATI was reorganized to become a part of Moscow Aviation Institute.

- Official website of government procurement in Russia (search field: Scientific research project on management).

3. Definition of subject segments and topics with prospective directions of research in the subject area "development of management theory and technology"
4. Model development of methodology of foresight research in the specified subject area to be used for enhancement of academic research activity in a particular HEI
5. Proposal development for improving management systems of the HEI's academic research activity based on the carried out foresight research.

The novelty of the research lies within formulation of foresight methodology for the specified subject area and development of proposals aimed at enhancement of academic research activity and the HEI's ratings positions. Within the framework of this research paper for the first time attempts were made:

1. To determine national tendencies in scientific research works in the sphere of management in Russia for the period of 2010-2014;
2. To determine database of prospective topics of scientific and innovative research in the sphere of management on a long-term basis based on foresight methods (e.g. literature review, expert panels, brainstorming, bibliometric analysis, SWOT analysis) in accordance with national priorities of academic and He development in Russia;
3. To formulate suggestions on improvement of organization of academic and innovative research activity in HEIs with orientation on increase in commercialization of the university's research results and improvement of HEI rating factors, in particular such factor as "level of academic research activity."

Formulation and implementation of foresight methodology for scientific research on management provides solution to such applied problems as): Discovery of prospective directions of academic and innovative activity in the sphere of management theory and technologies; construction of integrated matrix of academic project profitability for academic discipline "Management" that includes "opportunity windows;" improvement of academic departments engagement in scientific prospective projects exposed during foresight research (specifically, in the subject field of "management technologies and theory)."

5. METHODS

The research methodology consists of two parts: (i) Logical structure (subject, targets [sources], scope of research, methods, and results) and (ii) the technology of execution and task-solution.

5.1. Logical Structure of the Research

Subject of research: A group of researchers involved in the project "Enhancement of HEIs" academic research based on application of foresight methodology in the subject area "development of management theory and technology."

5.2. Research Targets (Sources)

- Database "Academic research in the sphere 'Management' (management of organization) in Russia for period 2010-2014"
- Prognosis of scientific and technological development of the Russian federation for the period through to 2030
- Subject areas and innovative technological decisions that have high potential for realization in Russia and are most competitive as compared to foreign counterparts
- Pivotal goals of socioeconomic development of Russia
- Project "Education-2030:" Megatrends influencing education system for the period through to 2030
- Global trends and challenges that pose threats and create "opportunity windows" for Russia
- Management systems of academic research in a particular HEI.

Scope of research: Emerging subject segments and topics with prospective directions of research in the subject area "development of management theory and technology" with consideration of national long-term priority directions of academic and HE advancing and increase in commercialization of results of intellectual activity.

Research methods: Literature review, expert panels, brainstorming, bibliometric analysis, SWOT analysis.

Technology of execution and task-solution (Figure 2).

The starting point of formulation of prospective themes of academic research in the subject area "development of management theory and technology" was evaluation of national priorities and analysis of already established trends in the specified subject area.

The most logical step under the circumstances has been to take into account the forecast of country's scientific and technological development as well as the HE in Russia for the period through to 2030 (based on the official data provided by ministries and other government bodies, statistic data and foresight research papers on the subject) in accordance with demand by leading branches of industry and directions of academic activity in Russian HEIs. Examination of the several official documents has been conducted and it was confirmed that goal-oriented instructions on further advance of management both as academic discipline and in practice have not been examined. The list of documents includes "Forecast of scientific and technological development in the territory of the Russian Federation for the period through to 2030" (published on January 3rd, 2014); National program "Development of science and technologies for the period 2013-2020;" National program of the Russian Federation "Industry development and its competitive recovery" (published on April 15th, 2014); Federal special program "Research and development in top-priority directions of Russian sci-tech complex for the period 2014-2020."

Considering what was said above, the authors of the research faced the challenge of "connecting" current existing tendencies in academic field of 'management theory and technologies development' with prospective direction of growth in the future while taking into consideration external threats and opportunities which have been becoming more acute in the light of recent events (Figure 3).

Figure 2: Context diagram of the project's technology of execution and task-solution

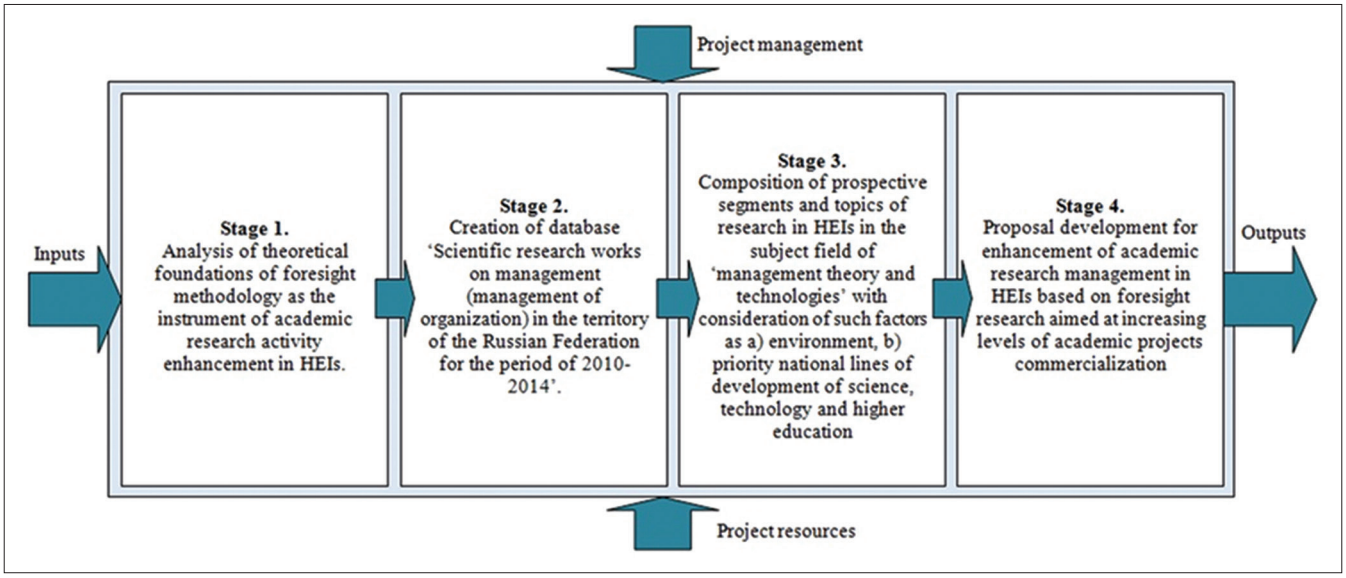
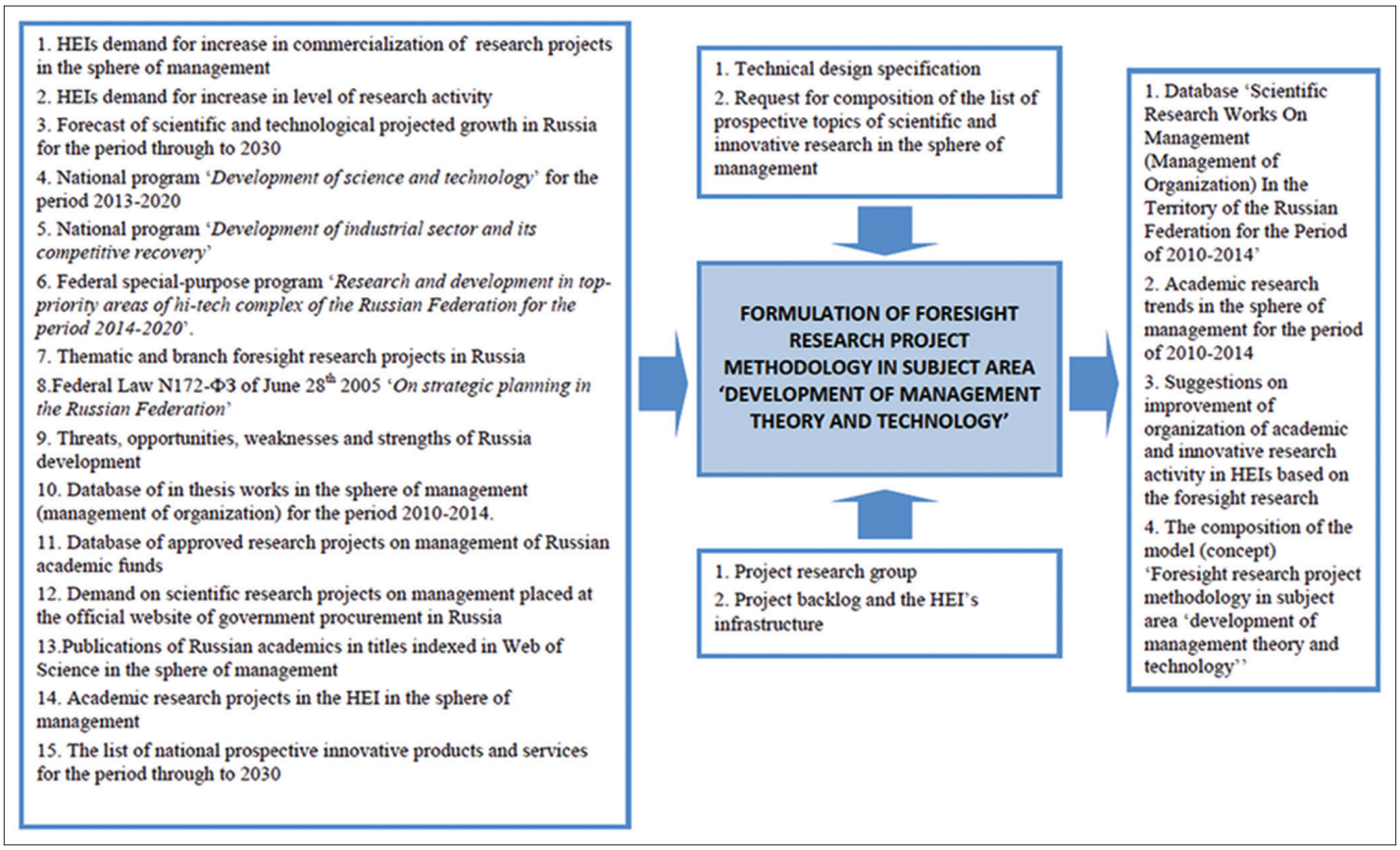


Figure 3: The concept of methodology development for foresight research project in subject area "development of management theory and technology"



This is why in order to clearly see in which direction the examined subject area has been developing over the last year the database "Academic research in the sphere 'Management' (management of organization) in Russia for period 2010-2014" was composed and analyzed[5].

5 Invention certificate registration number 2014621725, registered at 15.12.2014 with Russian Federal Service for Intellectual Property.

6. RESEARCH ALGORITHM AND RESULTS

The database composed during the research allowed to identify tendencies in the specified subject area for the period 2010-2014 and included information on the experts and scholars who focus primarily in management. The database was composed on national scale as it was the first country-wide attempt to incorporate otherwise scattered data on academic developments and directions

of research on management in scientific and applied spheres for the specified time period.

According to the database analysis for the last five years Russian academics that specialize in the subject of management focused primarily on quality management systems in industrial sector and enterprise management.

Thesis works on general management for the given period initially pursued the matter of formation basics, followed by development, and lastly mechanics and methods of perfection, valuation and efficiency growth of quality management systems in companies.

Whiles the tendencies for thesis works on general management are quite apparent, it is not possible to identify conclusive trends in thesis works of "enterprise management." It may be noted that despite the apparent multidirectionality of thesis works in the sphere of management, it is possible to distinguish two groups of research that focused on: (i) Strategic aspects of enterprise growth; methods, models and (ii) technologies of business structure development and perfection, including small business.

Thus, at this stage it is possible to conclude that there exists national tendency in academic research on management for the period 2010-2014 which is focus on evolutionary stages of development and growth of quality management systems introduced to domestic enterprises.

Therefore, this conclusion attests to the fact that on the one hand national scientific community shows interest in issues of quality management and strategic development in business organizations, but on the other hand it also indicates that there are no attempts to indicate long term prospects of technological, economic and social development and its impact on Russian business at present time and in future. These trends influence corporate strategic behavior in the contest of exceptionally unstable business environment which, in turn determine research directions and new management technologies capable of providing maximum socioeconomic benefits.

The following information units have been analyzed:

Unit 1: Database "Academic research in the sphere 'Management' (management of organization) in Russia for period 2010-2014."

Unit 2: Prognosis of scientific and technological development of the Russian federation for the period through to 2030.

Unit 3: Pivotal goals of socioeconomic development of Russia.

Unit 4: Project "Education-2030:" Megatrends influencing education system for the period through to 2030.

Unit 5: Global trends and challenges that pose threats and create "opportunity windows" for Russia.

As the result of the units analysis, two prospective research trends in the area of management theory and technologies have been identified, namely section 1 "Quality of life management in the city of Moscow, Russia" and section 2 "Business: Management of enterprise development" (Figure 4).

The next step was to make further specifications of prospective research topics in HEI in the subject area 'development of management theory and technology' to the level when it is possible to formulate concrete technical scope of work based on such methods as SWOT-analysis, brainstorming etc.

Topics formulated for the Section 1 "Quality of life management in the city of Moscow, Russia" (letter of interest for the grants issued by government bodies) are allocated in two groups:

1. The factors of quality of life management in the city of Moscow, triggered by the external environment: Migration, programs of adaptation for foreign citizens living in Moscow, especially in relation to creating awareness of the specific of Russian national culture, religion etc.
2. The factors of quality of life management in the city of Moscow, triggered by the internal environment: Increasing living expectancy, improvements of the quality of life etc.

Topics formulated for the Section 2 "Business: Management of enterprise development" (scope of work identified in business contracts) are also allocated in two groups:

1. Business management: Intraorganisational factors:
   - Transition from the old management systems with rigid formal rules, procedures and empowerment to the entrepreneurial type of management (manager must be proactive and capable of making informed decisions, must be responsible for the staff and community on the whole for the results of business activity);
   - Rise of the intellectualization of the managers' work life and staff on the whole (higher expectations of level of knowledge, skills and qualification) etc.
2. Business management: External factors such as war conflicts between Russia and its closest neighbors, economic sanctions etc.

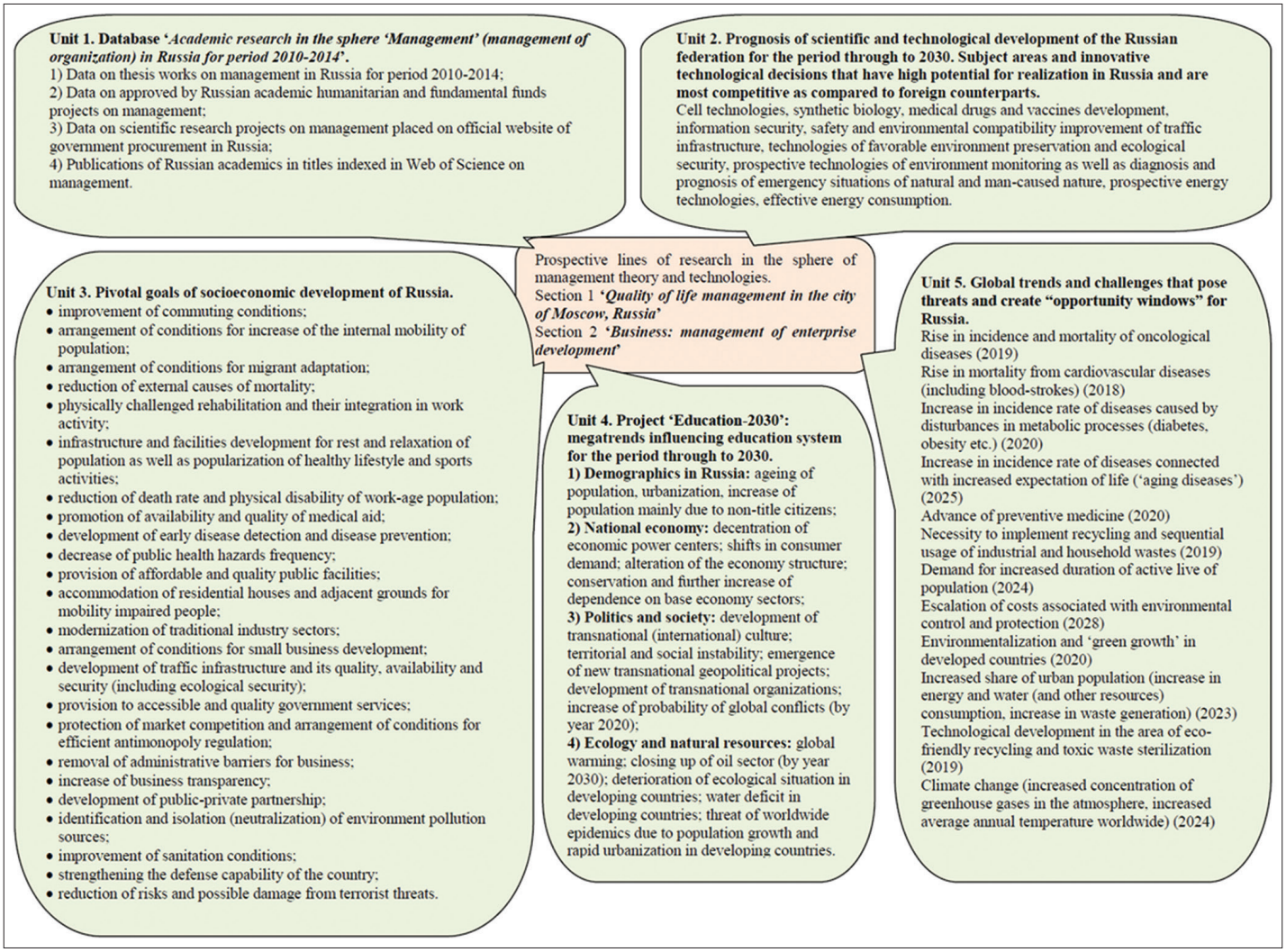
The formulation of the above mentioned sections and relevant research topics is therefore the first step in the application of the methodology to prognosis of academic research in HEI. One of the directions of the project's development was the conduction of national survey with the informational support from Russian Association of Managers.

The entire model of foresight methodology application in a specified academic subject area is shown on the Figure 5.

In order to implement foresight research as a regular part of HEIs prognosis tools, certain changes in organizational structure are warranted.

The authors of the study suggest introducing a separate Department of Commercialization and Transfer in HEIs' structure. The unit would be responsible for the execution of such tasks as: Carrying out foresight research in various subject fields, selection of priority directions of research, expertise of business effect from R&D projects with the goal of determining the most sought-after types of intellectual products, search and analysis of business proposals from potential investors, arrangement of license agreement. This could help achieve better results in capitalization of fundamental and applied research, their inclusion in economic turnover, achieving academic and business effect.

Figure 4: The plan of information usage for development of key sections of prospective research topics on management



Therefore, the application of foresight in regards to academic research in HEIs promotes the enhancement of R&D in HEIs, better incorporation of HEIs in regional and national innovation systems, cooperation with structures in real sector of economy to ensure knowledge creation, its expansion and appropriate utilization, as well as strengthening of competitive positions.

7. CONCLUSION

The study presented in this paper is an example of application of foresight methodology to study trends and perspectives in a specific subject area (management theory and technology development) in Russian companies for the purpose of improvement of HEIs academic and innovative activity and increase in quality of research projects in relevant subject area.

Based on the research results it was possible to formulate recommendations to Russian HEIs on making changes in the institution's organizational structure in the form of introduction of Department of Commercialization and Transfer that will carry out foresight functions on a regular basis such as:

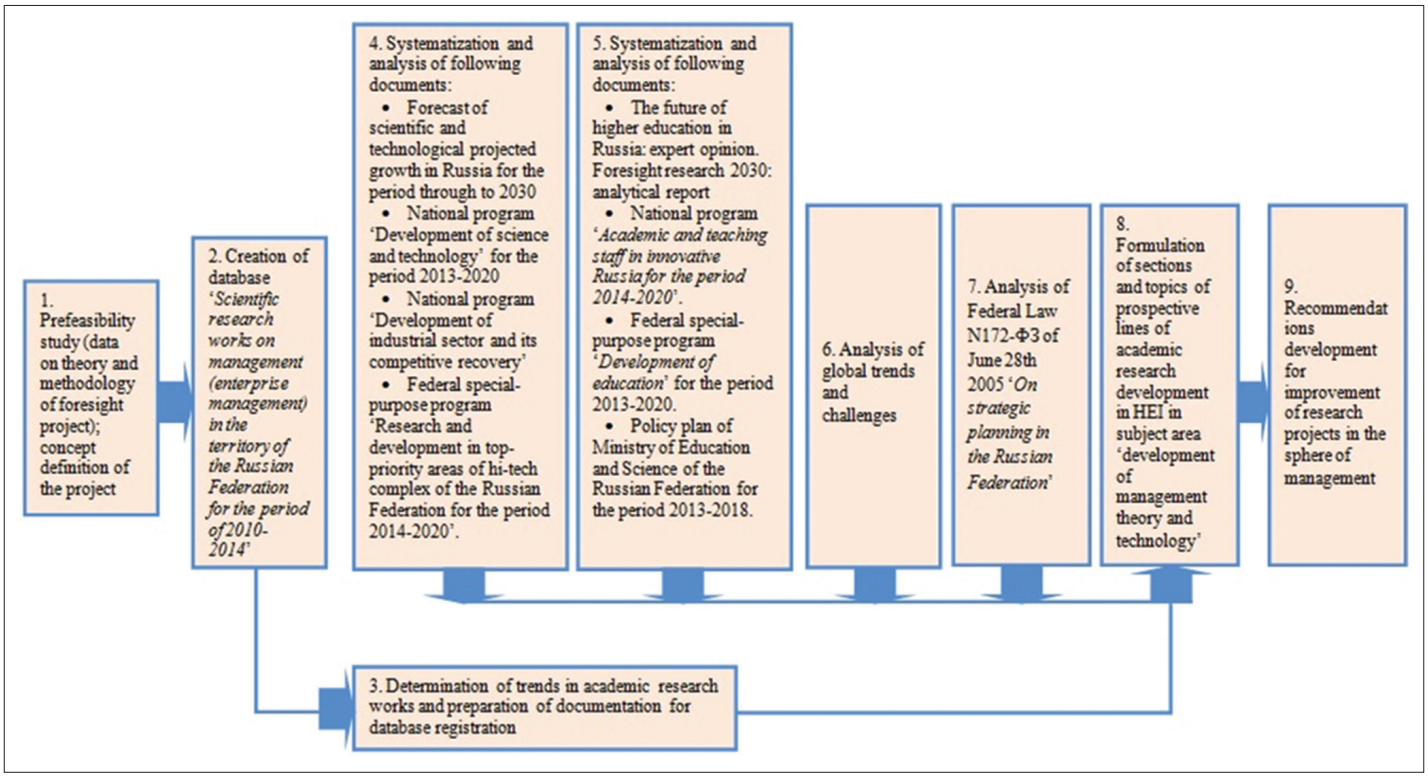
- Develop integrated matrix of academic projects profitability in the specified subject area;
- Formulate of "opportunity windows" for each department in HEI;
- Make improvements in academic departments engagement in scientific prospective projects exposed during foresight research;
- Make plans to increase the business effect from academic research outcome from each department.

The research made it possible to define concrete sections and topics of future academic research in a specified subject area with the aim of improving business effect from academic research and the level of research activity.

Among other findings is the fact that this kind of foresight research makes it possible to determine trends in concrete subject areas on a national scale as well as identify group of experts in specific subject areas.

One of the potential directions of development of the research presented in the paper would be the application of foresight in academic research on international level with assessment of global trends in various subject areas based on analysis of data from such sources as bibliographic databases (Scopus, WoS etc.), European

Figure 5: Model "methodology of foresight research in subject area 'development of management theory and technology' aimed at enhancement in academic research activity in higher education institution"



Commission grants database, the US federal grants database, database of European grants Welcomeupore etc.

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