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**STEERING OF UNIVERSITY  
RESEARCH IN THE RUSSIAN  
FEDERATION**

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# ABSTRACT

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The field of science in the Russian Federation has been undergoing a chain of reforms since the collapse of the Soviet Union. Within the other sub-sectors of state science university research sector plays a significant role in all reforms being the link between education and research. Russian government intends to intensify its role and efficiency by encouraging and supporting its participation as an active member in the development of the national innovation system. The gradual transfer of predominant funding of science from the federal budget into the competitive funding allocation method based on results, the government's support of the creation of research and innovative universities, state research centers contribute to the implementation of the national objectives aimed at modernization and increase of quality and efficiency of the higher education system and research of the Russian Federation. These positive initiatives require more efforts from the government to create necessary conditions and offer financial and legislative support to higher education institutions, research institutes and innovation-oriented enterprises.

*key words: steering, university research, Russia, funding, science policy*

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# ACRONYMS AND ABBREVIATIONS

ca. – approximately (circa)

DAAD – German Academic Exchange Service (Deutscher Akademischer Austausch Dienst)

etc. – and others (et cetera)

G8 – group of eight countries

GDP – gross domestic product

HEI – higher education institution

Ibid – the same place (ibidem)

i.e. – that is (id est)

INTAS – International Association for the Promotion of Cooperation with Scientists from New Independent States

IREX – International Research and Exchange Board

N – number

NAA – national assessment exercise

OECD – Organization for Economic Co-Operation and Development

PhD – Doctor of Philosophy

R&D – research and development

TACIS – Technical aid to the Commonwealth of Independent States

TEMPUS – Trans-European Mobility Scheme for University Studies

USA – United States of America

USSR – Union of Soviet Social republics

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# **1. INTRODUCTION**

## **1.1 BACKGROUND OF THE STUDY**

The present study addresses the issue of university research steering by examining the organizational structure of research activities, funding allocation, emerging university-industry-government relationship and the changes in university research steering approach in the Russian Federation starting in the early 2000s. Particular attention is given to the analysis of economic, political and legislative environments that determine the choice of the current steering approach.

Over the last several decades one can observe restructuring of higher education systems practically all over the world that consists mainly of a shift in the relationships between higher education institutions of various statuses and the state. It is being continuously modernized via improvement of quality of its processes and products, management of universities and higher education institutions to make it more competitive, efficient and effective.

The changes in the form and mechanism of governance, in its location, in governing capabilities and styles are generated by new social and economic demands for knowledge and high qualified labor force that require new approaches to steering of higher education systems. Therefore, the issue of higher education steering is the central in understanding the complexity of higher education systems.

Throughout the history of higher education, governance started as the responsibility of religious and local authorities that was funded directly by students and was modified to different levels of state responsibility based on funding and participation of external stakeholders. In a situation of increased number of students, types and number of higher education institutions, ongoing processes of internationalization and globalization, the demand for greater accountability to society and government on the one side and constantly decreasing state funding on the other side - universities and higher education systems, in general, as B. Clark put it “are caught in a cross-fire of expectations. And all channels of demand exhibit a high rate of change ... universities find themselves limited in response capability” (Clark 1998, 131). University is the

oldest establishment that has functioned over several centuries under different political, economical and religious conditions that means that higher education institutions are flexible and adapt to changes, however not immediately, but over time. This limitation leads to the failures and dissatisfaction of current governance approach and stimulates the necessity of shifts in governance with respect to higher education because of observed changed expectations of the society concerning the role of higher education and changed economic conditions. Therefore, there are continuous debates on which steering approach is more efficient under the current conditions, what type of research funding can provide higher education institutions with incentives to make the most effective use of these resources and its impact on the quality of research. Nowadays most governments of European countries are no longer able to afford to fully finance teaching and research activities in higher education unconditionally. They reconsider science and research policies in order to increase the transparency and effectiveness of government expenditure.

In the Russian Federation all these issues are even more complicated. In the Soviet Era higher education system including research was totally controlled, funded and steered by the state. In the field of research the government defined, for example, plans of activities, funding, selection and employment of the managerial personnel, fixed the working load, the amount of salaries, granted and confirmed scientific degrees and positions without leaving any level of autonomy and self-regulation possibilities. After the perestroika period there were several reforms in the public sector that incorporated higher education as well. Before 1996 under the conditions of the changing political system and privatization the main strategy of science regulation of the government was the position of non-intervention in the self-adaptation and reorganization by new market conditions. The main idea was to somehow retain scientific potential of the country in terms of scientific schools and organizations. The first trial to develop state science policy was made in 1996 by the ratification of the “Doctrine of the development of Russian science” (13.06.1996, N<sup>1</sup> 884) and the Federal law “About science and science and technology policy” (23.08.1996, N 127) which is still the main normative act regulating relationships in the field of science. After 1998 two possible ways of development have been discussed: innovative requiring revitalization of the national science system and resource-

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<sup>1</sup> N – number of the law

dependent that is limited by the decreasing amount of available raw materials of the country. The “Conception of the reformation of Russian science for the period 1998-2000” (18.05.1998, N 453) signified the official reorientation of the government policy from retaining existing scientific potential into reformation of the science and technology sphere and convergence of Russian science into the instrument of socio-economic development and provision of national security.

Traditionally beginning with the Soviet era research in Russia was done in the Academy of Sciences and research institutes that were separate from universities and attached to the Academy, and a minor part of research was done by universities based mainly on the Ministry order. Nowadays one of the reforms aimed at strengthening Russian research potential is the initiative to integrate again research institutes with the universities. Another trend is the promotion of a diversified and more competitive pattern of research funding, also for university research. For instance, universities do research not only for the state, but also for industry, national and international business companies.

There is a tendency to strengthen research in general and in the university sector in particular, however in the Federal law “About science and state science and technology policy” (23.08.1996, N 127) there was a norm to allocate not less than 4% of the federal budget to science during 8 years, but in reality it was around 2%. In March 2002 a decision to increase this number up to 4% was made in order to execute the law, however another federal law N 122 from 22 August 2004 excluded the condition to allocate 4% to science at all (Sadovnichy 2004, 18). Then in the document “The basics of the policy of the Russian Federation in the field of development of science and technology for the period of up to 2010 and further perspective” 4 % is stated as the long-term objective that has to be achieved by 2010. The actual amount of gross domestic product (GDP) in percentage for Russian science in 2002 was 1.24% that was only 0.21% higher than the previous year (Federal State Statistics Service 2004) that tells about the stagnation of the allocation of resources to science and research sphere.

The government is introducing market mechanisms in its steering approach to academic research. In October 2004 the Ministry of Education and Science developed the document “Conception of the role of Russian government in governing of higher educational institutions conducting research activities” according to which among 2338 universities there will remain

100-200 research institutes with better state funding. The idea is to reorganize the university research sector in accordance with the demands of the economy, research priorities, innovation policy in order to make effective targeted functioning of state research organizations that will be the Russian innovative core. President Vladimir Putin in his message to the Federal Assembly of the Russian Federation on 26<sup>th</sup> of May 2004 underlined the necessity “to integrate education and science. The development of university science and large research centers must be a priority goal.” This issue is the most discussed within scientific community and different authority levels. Besides some negative opinions arguing that the combination of two poor institutions can only make the situation worse while the majority of opinions are for this integration. Ministers, rectors of universities and academics understand the urgent necessity of combining the young university minds with sufficient equipment in the laboratories and contributing at last to the solution of the status of scientific institutes within universities. However, it is indicated the need for thorough elaboration of the process of integration with the participation of the industry as well (the detailed version of these discussions are available on the web site of the Parliament: <http://www.duma.gov.ru>). This process was initiated by the organization of the joint Ministry of Education and Science of the Russian Federation in 2004. It is promoted by various programs of the Ministry such as the priority national project “Education” aimed at supporting best educational institutions and research centers; competition of higher education institutions implementing innovative education programs in 2007-2008; competition of scientific projects within the program “Development of scientific potential of Russian Federation for 2006-2008” etc.

## **1.2 SIGNIFICANCE OF THE STUDY**

Steering approaches of higher education systems is a very controversial issue often discussed among educators, politicians, economists and sociologists. There have been many propositions and analysis of various steering models concerning higher education by F. Van Vught (1989), G. Neave and F. Van Vught (1991), P. Maassen and F. Van Vught (1994), A. Gornitzka and P. Maassen (2000), J. Olsen (1989), A. Amaral and A. Magalhaes (2001), G. Peters (2001), N. Cloete (2002) and others. A. Amaral, A. Magalhaes, M. Reed, L. Meek, H. de

Boer, C. Musselin approach institutional governance by analyzing mostly the examples of a particular institution and ways in which the shift of relations between higher education institutions and the state effect institutional governance, design. Their analysis is based on the organization theory that allows explaining better the dynamics of institutional restructuring and its impact on internal behavior and structures. P. Maassen, B. Karseth, L. Meek, G. Jones, Chavaillier employ a structural analysis based on policy studies and decision-making theory to understand the interaction between different levels of policy formulation and implementation. A group of authors (A. Amaral, A. Magalhaes, P. Maassen, H. de Boer, L. Meek) developed the stakeholder theory concerning higher education functioning. The idea of the stakeholder approach is that there are a number of competing and legitimate centers of authority that characterize and shape the policy making arena by forming alliances based on available resources and interests. Besides resource-dependency and neo-institutional theory are used by P. Maassen, A. Gornitzka, L. Meek, A. Amaral in order to understand the function of higher education systems under the conditions of environment changes pressure, however, again the analysis is carried out to study institutional challenges.

N. Cloete and P. Maassen (2002) developed a network approach to study higher education policy process. The interaction of three groups of actors: state-related actors, higher education actors and societal actors were presented in the form of an analytical triangle with the focus on the policy dimensions of the relationship. The analysis is based on the study of the policy process based on the changes of interests and authority among the state, society and institutions in order to develop a structural understanding of the nature of the system's change under the condition of complex interaction between these three groups of actors.

Steering is a complex phenomenon embracing the strong societal pressure that at the end shape the steering approach due to changes in the role of the state and expected responsibilities of educational institutions. The central planning model and a self-regulation model of government steering by van Vught (1989), later elaborated into state control and state supervision models by van Vught, G. Neave and P. Maassen (1991) are based on works of classic social science arguments. The dominant idea is the necessity of transition from state control to state supervising model because of the failure of too strong a control role of the government and the assumption that supervising role brings better performance. These two models are conceptually opposed to

each other. Therefore, more attention was given to four state models introduced by Olsen (1989) that are not mutually exclusive and represent four potential forms of relationship between the state and society, where higher education system is one of the components of the societal structure. The value of the steering models introduced by van Vught and Olsen is that they allow studying new government steering approaches without complete rejection of the old ones.

Peters (2001) studied the shift in governance approach by examining mostly the reasons which motivate the reform in the public sector, providing the diagnosis for the problems and suggesting possible solutions. His four models: deregulated government, market government, participative government and flexible government present the alternatives for the traditional governance approach while van Vught and Olsen's point of view is that it is impossible to completely eliminate the traditional approach and that the various combination based originally on the traditional state control model are more realistic. In the case of the Russian Federation where the sphere of research was least touched by reforms in the past and is currently undergoing its major transformations, Olsen's models of state steering are most appropriate. They represent the most typical combinations of steering approaches in Western democracies confirming the point of view that changes in steering approach occur without abolishing the basics of the former steering approach and institutional arrangements. Analyzing the government steering approach of university research using Olsen's models it is possible to logically find out the reasons and conditions signaling the necessity for change in the steering approach by giving more autonomy or strengthening the control.

So, there was and still is a great interest in studying governance models in higher education on all levels. However, among all these studies, there is little focus on steering of academic research in particular. Nowadays all countries realize the importance of an effective high quality research system, therefore the significance of this study is in providing focused information about the organizational structure, management and funding of academic research. In this respect, the steering models of van Vught and Olsen are the most appropriate, particularly for the Russian Federation where higher education system reforms started relatively recently after the collapse of the Soviet Union and the reforms of 90s did not touch on the field of research, science and technology that made it adapt itself to new external demands and conditions. The lack and

slow rate of structural and legislative change means that the process of developing modifications to academic steering approach is completely based on the traditional Soviet state control model.

The interest in the Russian Federation brings additional value to the significance of the study due to little awareness on academic research steering in Russia that is explained by the recent beginning of reorganization of the whole higher education system and the lack of publications in English as well. The Russian science and research system was formed according to the Humboldtian tradition with the integration of research and teaching like in many other European countries, however, in the Soviet era the separation of research from teaching and the strong ideological and political environment directed Russian research into its peculiar way of development different from other countries. The interesting fact is that it did not affect its high efficiency confirmed by a leading position in many fields of science and technology during quite a long period of time, however, this position is going down more and more every year. This is true not only concerning university research, but all Russian science in general. Therefore, it is important to analyze the undertaken steering approach of academic research in higher education institutions to find out the reasons for the present decrease of efficiency and to suggest some possible ways of organizing the relationship between the state and higher education institutions in the field of academic research under the conditions of the changing role of higher education in the society and the nature and characteristics of the research field in particularly.

### 1.3 CONCEPTUAL FRAMEWORK

To start analyzing the steering approaches of university research it is necessary to clarify the concept “steering” that is generally used alongside with such concepts as management, governance, coordination, power and direction in literature. Despite some minor differences, many social and political science authors use these concepts interchangeably and the definitions of which differ from author to author. According to Clark’s (1983) basic notion of the levels of authority within higher education systems there are superstructure or system level, institutional

level and department level. The following study focuses on the system level governance that represents the relationship between the state and higher education institutions.

The most widely spread notion is the concept “governance”, however since the late 1980s some scholars started using the concept “steering” to analyze the relationship between the state and higher education. Though it is talked about a lot, the concept of “governance” still remains polysemantic depending on the level of governance (institutional, system, supra-national), particular goals to be achieved and the sphere where it is used (political science, economics, education etc). In this regard, the “governance” might be defined in general as to “exercise collective control and influence over the societies for which they have been given responsibility” (Peters 2001, 1) or with the focus on particular aspect of this process such as interaction and relationships among the participants (Reed 2002), “the way ... higher education is organized and structures, as well as the way in which the management functions and decision-making structures are arranged” (Cloete et al. 2004, 2), “the rules, processes and behavior that affect the way in which powers are exercised at European level, particularly as regards openness, participation, accountability, effectiveness and coherence” (White Paper on European Governance 2001). A. Amaral, G. Jones, B. Karseth (2002) understand governance as a process that focuses on what higher education is or should be in a specific context: Who decides? How do they decide? What do they decide? Reed, M., Meek, L., Jones, G. refer to the concept of governance as “the notion of the relationship or dynamic interaction of bodies and groups operating at different levels of a higher education system” (Amaral 2002, 279). Therefore, the notion of governance comprises coordination and direction of actions (leadership), the process of achieving and monitoring of an organization’s results (management) and guiding of implementation process (administration) that explains its complexity and necessity to formulate its meaning in respect to a concrete sphere or level of interrelationships.

So, for the purpose of system level analysis the concept “steering” of university research will be used instead of “governance” due to its more flexible nature embracing all other processes like governance, management etc. It is necessary to note that in Russian language there is no such variety of concepts dealing with one or another aspects of influencing and controlling higher education systems. This is explained by the fact that there are two basic functions of steering. One is connected with the standard strategic organization of activities that defines clearly the

relationships between the stakeholders and the ways to achieve the goals. And the other is the so called operational management, i.e. the organization of the activities itself. In the Russian context until the recent times there was no distinction between executive and legislative authorities. All government institutions were based on the principle of one-man-management, but not on the principle of delegation of functions and public control.

In higher education governance can be interpreted as the relationships between higher education institutions with the external, internal and global environment. On each level governance presumes the determination of objectives, goals, mission, structure of decision-making, allocation and control of resources, structure of hierarchy and patterns of authority as well as the ways of interaction with all internal and external actors involved in the sphere. In the past, in the age of elite education, the governance of institutions was collegial and academics made decisions independently. Later with the expansion of higher education system, there appeared the need for common steering and control as well as for a body which takes into account the opinions not only of academics but of other stakeholders as well. Due to the decrease of public funding, it had to be replaced by private, external sources in return for increased dependence on a variety of interests, sometimes not applicable from the academic point of view. Nowadays, internationalization and globalization, particularly in the countries that signed the Bologna declaration, complicate the structure of governance even further, delaying and loosening the national governance power. Legitimacy and accountability are essential features of governance, as governing bodies must have legitimacy, i.e. be accepted by those who are ruled and through the process of mutual cooperation be accountable to each other and other external stakeholders. This has to be achieved with the help of proper communication channels and means of interpreting national policy to all stakeholders to avoid different interpretation.

This study is limited to the analysis of the steering of university research sector at system (national) level and that is why the focus is on the relationships between the government and higher education institutions. The higher education system of a country is not a separate element, it is closely connected to all social spheres and is subjected to the influence of their external pressures in order to meet the changing economic and political conditions of the country. Further, the national system determines the overall governance at institutional level making individual higher education institutions conform to the requirement of the national government. For

example, particularly in the case of the dominant budget funding, in order to get more funding, have more chance to win the competitions to conduct certain programs and projects, universities have to demonstrate their contribution to the achievement of national goals and that they are very responsive to the initiatives of the Ministry of Education and Science in terms of introduction quality assurance systems, increasing internationalization, commercialization of research results etc. Supranational governance affects the national one through defining unified common goals and objectives, research and development strategy plans. For the Russian Federation supranational governance is not as important as for the European Union Member countries, however, within the European Research Area, Russia is eligible to participate in joint programs and projects funded by the European Commission. Therefore, in order to participate, Russian universities and individual researchers have to take into account European research objectives, goals and priorities and by this way are influenced indirectly.

On the basis of the above mentioned explanation, in this study the concept steering is understood as the overall process of directing the course of the higher education system of the country by exercising governance, management and power. Therefore, the steering of academic research means overall direction and coordination of university research activities towards the provision of an appropriate well-functioning structure that serves the national goals, i.e. the particular approach the government uses to control and influence public research.

To analyze the interaction of the government with higher education institutions, conducting academic research in the overall system of state steering of higher education the four models introduced by the Norwegian scholar Johan Olsen will be employed. Olsen (1989) developed two variations of the traditional governance model (the sovereign and institutional state) and two alternatives to them (corporatist and market state). These models represent different position and role of the state towards higher education (dominance, protection, equal interest participant, minimal state) and the character of the relationships among them. They are not exclusive and in practice there is a mixtures of elements used, creating “hybrid” forms of governance (Gornitzka & Maassen, 2000).

The sovereign or rationality-bounded model is characterized by strong state control where higher education is an instrument for achieving the political, economic and social goals of the country. All changes are possible due to the change of political coalitions.

The institutional steering model is based on the mutual relationship of the state and higher education institutions that gives them power and responsibility to protect academic values and traditions against any political or other kind of interests. Any change according to this model happens as a historical process of development.

The corporate-pluralist steering model assumes the presence of several competing actors and legitimate centers of authority and control over higher education institutions, i.e. the Ministry of Education is just one actor that influences and controls. Changes in this system depend on changes in interests, power distribution and coalitions.

The supermarket steering model presumes a minimal role of the government in the higher education system, while everything is decided and done by public bodies. Changes happen because of change of the environment, i.e., redistribution of resources available to the stakeholders.

These four steering models in higher education also might be used in analyzing the research steering because university research is one of the interrelated parts of a higher education system of a country. They allow focusing on the changes of the relationship between the government and higher education institutions conducting academic research.

Also central planning and self-regulation models of government steering introduced by van Vught (1989) that were later elaborated into state-control and state supervision models (Neave and van Vught, 1991, Maassen and van Vught, 1994) will be used. State control model is characterized by strict authority of the government where academic community has the authority over internal university management affairs in the best case as in most cases this authority might be just a formal one. State supervising model assumes the division of authority over universities, government and the academic community. The state influences indirectly performing the role of the supervisor (coordinator) of the higher education system of the country assuring its quality and accountability. It does not utilize strict control and detailed regulation (van Vught 1994). It is also called “self-regulatory model” that emphasizes monitoring and feedback from the government. The situation when the government is not the only actor who directs and controls, but when the HEIs, state bodies are co-partners in maintaining, steering and controlling of the higher education system that allows to “achieve peaceful coexistence between the governed and those who govern,

emphasizing the learning and mutual adjustments would take place in both camps” (Maassen & Stensaker 2003, 86). Within this approach higher education institutions are responsible themselves for monitoring input, processes and output and governments play a role of a second-order regulator, responsible for managing the rules of the game, and not the game itself (Maassen & Stensaker 2003). So, government guides the higher education system in order to ensure that it goes the right way and to protect it from reaching unsatisfactory results. Therefore, even if from the title of the approach the role of the government seems to be zero, it is not so in fact, because within any self-regulatory complex systems there should be a guiding body otherwise it will lead to chaos and incarceration of interests of its members. In political science literature it is referred to as “reinventing government” (Osborne & Gaebler 1992) whose role is to promote competition between service providers, pushing control into the community, measuring performance by outcomes, defining their client as customers, decentralizing authority, using market mechanisms and steering rather than rowing (de Boer & Goedegebuure 2003).

Self-regulatory steering approach with respect to higher education was introduced in the late 1980s and early 1990s in Europe and other parts of the world (Gornitzka & Maassen 2000) because of the understanding that the government cannot decide which social expectations and needs should be included in the higher education policy agenda, how to do this on the one hand and the rapid growth and the growing complexity of higher education system on the other hand (Cloete & Maassen 2002). This approach presumes a high degree of autonomy and accountability of HEIs and leads to focusing on the performance of the institutions and students rather than setting the conditions by the government. Autonomy might be considered as a necessary condition for survival of the higher education system because it needs to continuously adapt to changing needs, demands of the society, technological, economic advances, i.e. to be flexible and able to manage the resources itself. It makes HEIs more accountable, responsible to the public about the expediency of the usage of resources. The main instruments of government steering are well-established information flows and communication mechanisms. So, van Vught’s state control and state supervising models are interesting and important in this study for the analyses of the steering approaches towards university research sector because they do not depend completely on the market. They presume that the government always plays a significant role that is especially true in the area of research the result of which might be very long term and not predicted that excludes its full market coordination.

There are two sides we can analyze in governance: structural and functional (Sibeon 2000). Functional is more about the nature of various parts of the system and the extent to which some parts contribute to the maintenance of it as a whole, the intended and unintended consequences each new or eliminated part produces. While in the context of steering it is better to analyze it structurally, i.e. in what ways these parts are combined and managed over time because the more important is the relationship between the parts and their balance that ultimately determine the steering approach. It is like when some parts seem completely not alike but the system in general has structural similarity. Therefore, in the study of steering approach of university research in the Russian Federation the structural side rather than the functional side of the concept of “steering” will be focused on in order to investigate the characteristics and functioning of the system of university research organization, management and funding.

#### **1.4 RESEARCH PROBLEM**

For the purpose of examining the university research steering approach this study analyses the relationship between higher education institutions and the government as well as emerging industry / private sector relationship. The starting point is that public higher education institutions are the main generators of knowledge production that intensifies economic development and prosperity of the country and they need resources from interested stakeholders like governments, who benefit directly from university research activities. However besides research, higher education institutions have also other tasks, for example, teaching. Hence, relationships between government and universities are affected by the environmental conditions in which the collaboration takes place.

For this study, the emphasis is placed on investigating the financial pressures and opportunities of university research steering in the Russian Federation. Therefore, the main research question has been formulated as:

What funding patterns are used to support the current steering approach toward university research in the Russian Federation?

In order to find out what kind of funding mechanisms are used to support the undertaken steering approach by the Russian government first it is necessary to look into the organizational context of the university research sector to identify the benefits and problems of the current university research steering approach. The analysis of the existing funding patterns will allow exploring the advantages and disadvantages of various funding allocation methods and their contribution to the well functioning of the steering approach towards the university research sector. The consideration of the normative base of the Russian university research sector, as well as, the governmental policy aimed at the developing the innovation system of the country where it is devoted a significant role to higher education institutions, leads to finding out the level of compatibility between the steering approach and how it is transferred in action plans and programs. What causes problems and where is the potential for university research sector development.

The whole study is based on the existing literature and official documentations related to the organization and functioning of the state science sector in the Russian Federation since the 2000s. The main intention of the work is to discuss the role of funding in steering of the university research sector and how well the funding supports it and the overall science and technology policy of the country. This will show the trend of changes in steering of Russian science during the period of 2000 to 2005 and give some perspectives on the further development of the science and technology sector in the Russian Federation. The choice of Olsen's and van Vught's steering models as the background format has been made because they provide the study with a simple strategy for analyzing the changes of the steering approach, as well as, the insights into internal and external factors influencing the choice.

The idea is to build a picture of the Russian university research sector from a critical point of view that has not been done in Russia or abroad. All previous studies have concentrated on the science sector in general without paying a particular attention to the university sector. However, due to the last changes in state science policy it is the university research sector that must play a crucial role in improving the quality of Russian science and education and be the main member in constructing the national innovation system. Therefore, descriptions, analyses and discussions provided in the work are interesting for policy makers, government, higher education institutions, as well as, the whole scientific community in order to have a better understanding and clearer

picture of the present development and the future perspectives of the steering of the university research sector in the Russian Federation.

## 1.5 METHODOLOGY

The undertaken study of the steering of university research in the Russian Federation is based on a qualitative research, particularly on the content analysis of the policy documents, research priorities, various research programs, research plans and results of example public universities and other relative documentation. The combination of these methods of data collection is used to acquire a valid description of the current innovative infrastructure. The choice of a qualitative research method is explained by the nature of the research question that starts with “What funding patterns ...” that requires first of all the description of what is going on, in contrasts to quantitative methods that focus on “why” and usually look for a comparison of groups of variables etc. Qualitative methods allow the researcher to explore better the field of the research by making a detailed overview of the whole topic. Creswell (1998, 15) said that “quantitative researchers work with a few variables and many cases, whereas qualitative researchers rely on a few cases and many variables.” In the case of an analysis of an academic research system it is impossible to have lots of cases, but more feasible to have many variables in order to explore in what way the promoted governmental steering approach of university research is translated into practice based on the research view point. This approach makes the study more objective and less influenced by subjective experts’ judgments and with “the emphasis on words rather than quantification in the collection and analysis of data” (Bryman 2004). It serves to “build a complex, holistic picture, analyze words, report detailed views of informants and conduct the study in a natural setting” (Creswell 1998, 14).

Tashakkori and Teddlie accurately remarked that “most good researchers prefer addressing their research question with any methodological tool available, using the pragmatist credo of “what works” (1998, 21), underlining the fact that method is secondary to the research question, that determines the success and value of the study. Therefore, some elements of

quantitative research might be also used in case of their necessity to create a more solid picture and to gain a deeper understanding of the situation.

As most researchers agree qualitative studies rely on four basic methods for gathering information: participation in the setting; observation; interviewing; analyzing documents and material culture that vary within each other as well (Marshall & Rossman 1999). Taking into account the geographical remoteness of the Russian Federation and the tight time-period for the master thesis writing, the undertaken study is based on document analysis: secondary analysis and official documentation in the field of science and technology. The documents will be obtained from the web sites of the Ministries, National Statistics Agency, official sites of universities, as well as, from publications in journals and newspapers on higher education and research issues. Secondary analysis represents the data that have been collected by other researchers or organizations, so it is cost and time effective. The fact that the data is stored in governmental sites and official institutions' web pages signifies its good quality and appropriate level of reliability. It is possible to spend more time with data analysis and continuous reanalysis of which might offer new interpretation. At the same time the weakness is that the researcher is not familiar with the data and it takes time to know the structure and contours of the data. Secondary data might be very complex that is not necessary for the purpose of research and only makes the study more difficult, as well as, there is no control over data quality, however depending on the source it is assumed (Bryman 2004). Among three possible approaches for interpreting documents (qualitative content analysis, semiotics, hermeneutics), the best tool for the undertaken study is the qualitative content analysis that "comprises a searching-out of underlying themes in the materials being analyzed" (Ibid, 392). Its greatest strength is that it is unobtrusive and non-reactive, i.e. can be conducted without disturbing the setting in any way (Marshall & Rossman 1999, 117). This method suits the research as it can "provide adequate information, be cost-effective, and be feasible in terms of the subtleties of the setting and the resources available for the study" (Ibid, 133).

Another important issue is to keep validity and reliability of the study undertaken. The notion of validity and reliability in respect to qualitative research depends mostly on the philosophical perspective (positivist, post-modern way of interpretation) employed by the researcher. Kvale (1995) claims that the goal of qualitative research is to construct validity,

meaning “choosing among competing and falsifiable interpretations, ... examining and providing arguments for the relative credibility of alternative knowledge claims” (Polkinghorne 1983, 26). This goes in line with the primary criteria for assessing a qualitative study by Lincoln and Guba (1994 in Bryman 2004) such as trustworthiness and authenticity. Trustworthiness assumes that the process of conducting research and findings are credible, transferable, dependable (the degree to which theoretical inferences can be justified) and confirmable by the auditors. Authenticity of the study shows that it covers the whole topic fairly allowing better understanding of the problem and generating further actions for change. Reliability is usually defined as the level of accuracy of the measured data that can be achieved by comparison with the other researchers or using different methods. Interpretations of national research policy derived from the press and analytical reports will be based on personal view points, as well as, all interpretation of the situation and data made by the researcher.

## **2. STEERING OF UNIVERSITY RESEARCH**

### **2.1 ISSUES OF STEERING**

In general the concept steering embodies the relationships between the government or any kind of state authorities with higher education institutions. As Åse Gornitzka and Peter Maassen pointed out, there is a set of context (overall environment at the moment) and interaction (customary structure of actors' behavior) rules that determine these relationships (Gornitzka & Maassen 2000). The analysis of the context and interaction rules allows better understanding of the undertaken steering approach.

In this study the limitation is the public higher education institutions conducting research due to the fact that public and private sectors are different because of the different interests of stakeholders involved. In the private sector the government is less interested in various accountabilities and good elements that might characterize a good governance approach than in the public one, for example operational efficiency, equity etc. In general, only the federal law "About Education" (10.07.1992, N3266-1) allowed the creation of private universities that are basically pure teaching oriented institutions specializing in market demanded course in humanities and social sciences. They are managed directly by the owner, however they have to have a license to offer educational services in the Russian Federation. Some private higher education institutions can apply and get state accreditation that will mean the validation of the quality of the Diplomas by the Ministry of Education and Science. An interesting fact is that a large number of teaching staff of private universities is comprised of the full-time staff of the public ones that might characterize the pure commercial function and orientation of these institutions.

Despite the fact that the study focuses on the period after the collapse of the Soviet era, beginning with the presidency of B. Yeltsin, it is considered important to mention some words about the background conditions that were the basis for the further development of the higher education system in the Russian Federation.

The Russian higher education system is based on the principles of the Soviet state that is high level of state-control by the government, ideological influence that led to the necessity for changes. This is the case of the sovereign state model that was the only model in all sectors of Soviet society, as well as, it was characterized by its peculiar nature. It was a uniform centralized control system with rigid hierarchical relationships between ministries and educational institutions, and top-down way of implementing national priorities and goals. The situation was complicated by the diversity of controlling governmental centers of authority. For example, higher education establishments were controlled by seventy-four different all-union and republic ministries, so in general each establishment was controlled by around thirty ministries at the same time (Berry 1988, 58). Science was controlled politically by Politburo of the Central Committee, then by national bodies responsible for the implementation of the policies such as the State Committee of Science and Technology, USSR Gosplan, USSR Academy of Sciences etc, then by the ministries in each field plus by some regional bodies responsible for science. There was a situation of control and governance by many overlapping and conflicting bodies of authority on different levels in the state hierarchy.

However, the Soviet education system had its own advantages in terms of 100% public funding, rigid organization structures which made it very predictable, strong didactic teaching methods which contributed to the major advancements in science due to unlimited public funding of strategic areas in science and technology that allowed it to be one of the leading powers in the world. After the collapse of the Soviet Union the country entered the period of global reforms, including the sphere of higher education with the aim to democratization and establishing a market economy.

The reforms started in 1991 signified the transition of higher education from central planning and control to gradual introduction of market mechanisms, but due to strong values, traditions and culture of people who are used to the previous regime, all reforms were adapted to a peculiar Russian context. They were aimed at diversification of higher education, decentralization of management, university autonomy, creation of private sector that could facilitate the country's requirements for substantial increase in the demand for higher education (Kara-Murza 2007).

The federal law “About education” (10.07.1992, N 3266-1) gave more autonomy to higher education institutions, i.e. to open new programs, to start enrolling commercial students and to offer educational services on a commercial basis. Institutions are responsible for textbooks, teaching methods, construction, equipment, but at the same time the core element remains centralized as one half of the funding comes from the government and all funds of universities are under strict control through a system of treasury accounts. The government carries out accreditation, licensing, attestation of public and private higher education institutions, establishes detailed unified standards of higher education programs defining the curriculum and content for all disciplines, keeps monopoly to issue diplomas, degrees and titles.

Today, higher education is under the jurisdiction of the Ministry of Education and Science of the Russian Federation, which is responsible for the overall guidance, developing state policy, accreditation, licensing of higher education institutions and for developing and maintaining state educational standards, legislative management of higher education and science, development of federal centers of science & technology, state scientific centers, intellectual property, managing youth policy, up-bringing, social support and assistance. It is subdivided into several agencies: Federal Agency of Education (organization of training, retraining of employees and activities of educational institutions); Federal Agency of Science and Innovations (realization of government policy in managing state property in the field of scientific, technical and innovative activities, maintenance of data ware of scientific, technical and innovative activities); Federal Service for Intellectual Property, Patents and Trade Marks (control and supervision of legal protection and usage of intellectual property objects) and Federal Service for Supervision in the Field of Education and Science (legislation execution, quality assurance, licensing, state accreditation of HEIs, awarding scientific degrees and titles, organization and accreditation of Scientific Councils for defending Candidate of Sciences and Doctoral theses). Russian Federation degree system is characterized by some intermediary education and science degrees, so, for example, Candidate of Sciences degree is between the European Master’s and Doctoral degrees and correspond to the Finnish Licentiate degree (Ministry of Education and Science of the Russian Federation 2006).

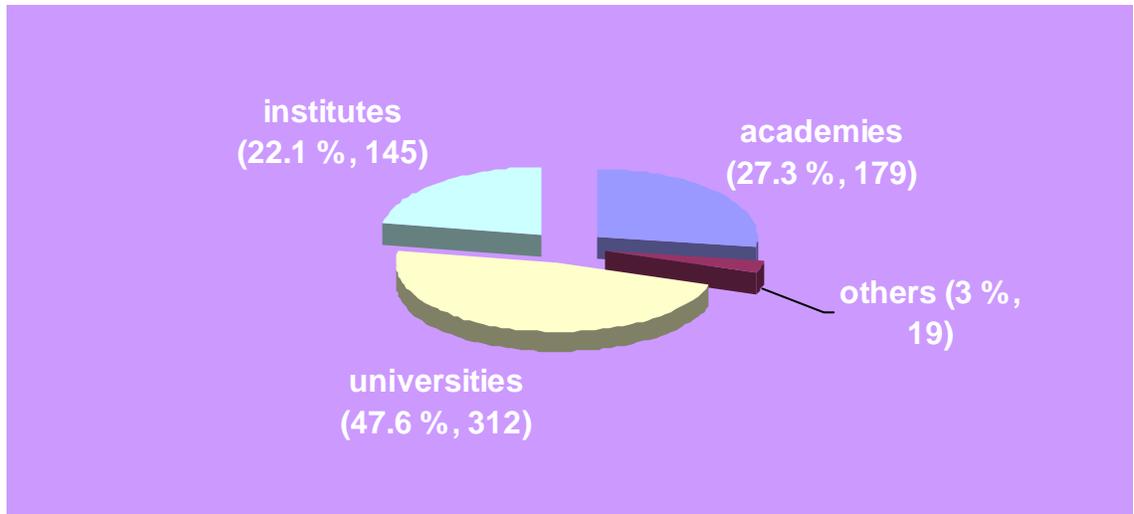
At regional level governance is carried out by education departments and committees which define and implement regional educational policy. At institutional level, the management is performed by the Academic Council (elected rector, vice-rectors, deans and two-three

representatives from each faculty, including the student union's representative) who chooses how to organize the educational process, to hire and fire personnel, to organize its own research, and partially financial and economic activities (Gohberg 2004). Public state funding decreased twice, university graduates cannot find employment due to the un-controlled increase of paid education places in humanities. However, the number of higher educational institutions increased from 626 in 1993 to 1071 in 2004 (State Statistics Agency 2006) through private institutions and fee-based places in public ones. This fact leads to the concern of the quality of educational services and competence of the graduates. The federal law "About education" (10.07.1992, N 3266-1) gave more nominal than real autonomy to higher educational institutions that is in practice restricted by central decision making concerning curriculum, funding, priority areas, number and character of specialties with independence in terms of the right to hire and fire personnel, choose how to organize the educational process, as well as, in research and commercial activities.

## **2.2 HIGHER EDUCATION SYSTEM IN THE RUSSIAN FEDERATION**

According to the data of the Federal State Statistics Service (2006) higher education in Russia is provided by 655 public and 413 non-public higher education institutions in 2005/2006. In 2005/2006 the number of Russian students was 7064,6 thousands with 85% being educated at state HEI and 15% at private HEI. The share of non-state HEIs is relatively low and mostly this sector has local importance, offering the opportunity to study for public demanded professions such as economist, accountant, lawyer, and psychologist.

The Russian higher education system represents a single public system with multiple sectors. There are four main types of institutions at the university level according to the definitions of the federal law "About education" (10.07.1992, N 3266-1): university, academy, institutes and private educational institutions that might also have the status of university, institute or academy. Sometimes there are educational institutions with the less determined status, for example colleges that function like institutes that are considered as part of higher education.



*Figure 1. Types and the number of public higher education establishments. Ministry of Education and Science of the Russian Federation 2006.*

Universities are responsible for education and research in various disciplines, with the division into classical and technical universities, the latter with special attention to basic and applied sciences. The former pedagogical institutes are included as well as, after they have been granted the university status. University is the main type of educational establishments which alongside with offering teaching, conduct basic and applied research and offer training programs at all levels, including the highest scientific degrees of Doctor in all ranges of natural and social sciences as well as humanities. A strong research component is one of the obligatory conditions for the status of a university that has traditionally been based on the Humboldtian model, emphasizing the role of scholarship and science and freedom for research in higher education. This is currently changing due to the Ministry of Education and Science national program of creating a certain number of research centers by joining several leading research universities in a region under the conditions of vast government financial support. This might lead to gradual elimination of research activities in other smaller institutions because of the lack of funding that finally leads to incapability to compete for state as well as private funding with newly formed research centers.

An academy is a higher education institution offering training at all levels, conducting research in one particular area of science, technology or culture (for instance, academy of

architecture). They are considered the leading research and methodological centers in their area of activity. It is very important to distinguish two types of academies in the Russian Federation. The first one is the higher educational institution, while the second one is the Russian Academy of Sciences. It is the supreme scientific institution of the country and leading centre of basic research in natural and social science (Russian Academy of Sciences 2007). The Academy is not an educational institution, however, it is closely linked with the whole system of scientific research and higher education in the Russian Federation. The Academy includes nine departments by science subject, three regional branches and fourteen regional scientific centers.

Institutes are multi-discipline higher education institutions that might be independent structural units, or parts of a university or an academy, usually specializing in one field. The exception are the pedagogical institutes that cover the full spectrum of disciplines taught at schools.

Private institutions offer degrees mostly in non-engineering fields. The number of such institutions is increasing each year due to the market demand. However, these institutions do not conduct any research activities and grant basically the degree of the Bachelor or its equivalent.

From the Soviet era there is a number of research institutes of the Russian Academy of Sciences that were founded parallel to other higher educational institutions offering professional training and research. Their major function is conducting basic and applied research with very limited or no cooperation at all with the other higher education institutions of the country.

All higher education institutions work under the jurisdiction of the Ministry of Education and Science which is responsible for their accreditation, development and maintenance of State Education Standards. Some types of institutions are established and belong to different central bodies. For example, the Moscow Institute of International Relations is under the Ministry of Foreign Affairs, the High School of Economics is under the Ministry of Economic Development and Trade and Ministry of Education and Science, while the majority of institutions are under the Ministry of Education and Science or some are in the process of transferring to it.

The government of the Russian Federation is implementing the two-levels of higher education studies plus Doctoral one that is compatible to European two-tier system of Bachelor and Master degrees in contrast to the only former Soviet five-years specialist Diploma.

After at least two-years of studies an intermediate Diploma might be granted that confirms incomplete higher education allowing to continue studies later or start working in some occupations. Bachelor is the first academic degree that is required for admission to Master studies. It is awarded on the basis of state examinations and a defense of a thesis prepared over a four month period. Specialists Diploma is a traditional qualification in Russia that gives access to professional practice and to the admission to further scientific degrees (Candidate of Sciences and Doctor). It is awarded based on the results of the state examinations and a defense of a project or thesis. Master's studies are characterized by their research-orientation in comparison with the Specialist program that is more practice-oriented. The State Educational Standards define only the general requirements of Master programs, so institutions are free to define the contents of the programs themselves. For those wishing to pursue scientific careers universities and academies offer two levels of doctoral degrees. The first level is the Candidate of Sciences Degree that is granted after three years guided research, exams and defense of a thesis. The highest academic degree in the Russian Federation is the Doctor of Sciences after the completion of the thesis that includes results of fundamental scientific and applied significance and exams.

There is also a non-university level (Srednee Professional'noe Obrazovanie) that does not lead to university degrees. There are ca. 2500 state and municipal non-university level HE establishments, enrolling over 2100 thousands students. The main types are "tekhnikums or uchilishcha" that are new types of colleges or lyceums that offer educational programs of non-university HE level of advanced type (ca. 680) (Ministry of Education and Science of the Russian Federation 2006).

The regulatory framework of the higher education system in Russia is defined by the Constitution of the Russian Federation (1997), the federal law "About education" (10.07.1992, N 3266-1), the federal law "About higher and post-graduate professional education (22.08.1996, N 125), various regulations by educational authorities, presidential decrees or executive orders. All higher educational institutions have to report to the central federal authority the issues concerning

budget funding, official accreditation and licensing, developing education programmes and compliance with the laws and regulations of higher education.

In Russia the evaluation of educational performance in order to ensure that they conform to the training level and quality according to the requirements of state education standards is carried out through a complex assessment (starting January 1, 2000) of attained levels of each higher education graduate by the State Attestation Committee and then through a decision on the attestation made by the State Attestation Service that is responsible for establishing the conformity of the content, level and quality of graduate students' training and state educational standards. The quality assurance system is based on three procedures that are indicated in the federal law "About education" (10.07.1992, N 3266-1): licensing, state accreditation and attestation based on state educational standards. It is carried out by three main state bodies: the Department of Licensing, Attestation and Accreditation of the Federal Service of Supervision in Education and Science; the Accreditation Board of the Federal Service of Supervision in Education and Science and National Accreditation Agency of the Russian Federation. The National Accreditation Agency (NAA), established by the Ministry of Education in 1995, plays a major role in supporting HEIs, other Russian educational establishments and educational authorities in their state accreditation procedures. It prepares documents for the Ministry that makes accreditation decisions based on the report of the Accreditation Board (about 50 members from educational and non-state organizations). NAA conducts research into accreditation and quality assessment, designs assessment procedures, develops software for different stages of quality assessment and provides information on accreditation status and procedures by developing the central data base. Once a year it publishes the list of all accredited higher education institutions for the general public. The system is strongly state controlled, while at the same time public higher education institutions try to develop and implement their own internal systems of quality maintenance and assessment. Usually this is done by implementing public-professional accreditation programs within a professional association.

### 2.3 STEERING OF RESEARCH IN THE RUSSIAN FEDERATION

To start talking about the research structure it is necessary to indicate that historically Russian science was launched within universities and that it was done according to the Humboldtian principle of the integration of teaching and research. However, in the beginning of the 1930s the Soviet government made the reform of the research and educational institutions of the country by administratively separating research from teaching. During the Soviet times Russian science was considered one of the best in the world thanks to the fact that it was the part of the ideological state steering of the economy and society. The unique nature was the creation of huge scientific technical potential that mainly worked for military and industrial needs and the priorities of the country. Despite that there was a huge bureaucratic stratification. For security reasons there were around fifty closed science cities. They usually contained one or two specialized enterprises and related scientific institutions. The research of these centers was of little commercial orientation, therefore, they were completely funded by the government. Nowadays there are still these kinds of closed scientific centers, however with more commercial oriented activities due to the decrease of state budget funding (Saveliev 2002).

The authoritative body responsible for science in Russia has undergone the biggest number of reorganizations, re-specialization and restructuring in comparison with other ones after the 1990s that influence its capability. In the Soviet period the State USSR Committee on science and technology was responsible for science steering. In 1991 it was renamed the State Committee on science and technology of the Russian Federation. However, already in the beginning of 1992 the Ministry of science, higher education and technology policy of the Russian Federation was created and was transformed into the Ministry of science and technology policy in 1993 separating the higher education into an independent body. Then it was reorganized into the State Committee on science and technology in 1996, the Ministry of science and technology in 1997, the Ministry of industry, science and technology in 2000. And in 2004 science and education were combined together again under the Ministry of Education and Science of the Russian Federation (Kara-Murza 2007). The frequent changes of this body prevented it from proper functioning that was compensated by developing just numerous doctrines and conceptions of the development of science. But it managed to initiate successfully the idea of developing the system

of state science foundations and the system of state science centers as well. In 2007 the major authority bodies regulating the field of science and technology are the Ministry of education and Science, and the Federal Agency for science and innovations. The latter is under the jurisdiction of the Ministry and is responsible for the implementation of the state policy and management of state properties in the field of scientific, technological and innovative activities.

The organizational structure of the national science and research activities consists of three major sectors: academic, university and applied according to the classification of the Ministry of Education and Science of the Russian Federation (2006). However, some scientists distinguish besides these two other sub-sectors of academic and applied ones. Therefore, according to Russian researcher Naptsov (2005) it is subdivided into the specialized knowledge sector and the sector of state science centers and the sector of small science business.

The academic sector with its primary focus on fundamental and applied research is carried out by various branches of the Russian Academy of Sciences that was created originally by Peter the Great for basic research. During the Soviet period academies were the dominant centers of research of the country with high prestige, high qualified personnel and generous state funding. Therefore, the academic sector comprises of research done in the Academy of Sciences and its branches.

The university sector is represented by research institutes and university laboratories and departments. Its main function is the training of scientists, engineers and researchers of the country. Research was not considered the necessary function of a higher education institution, except in a number of big elite universities located in major urban areas and the capital. According to Alfred Watkins (2003, 8) during the 1980s universities received only 10% of budget funds allocated for research and development activities for the country. However, about 1/3 of scientists and 50% of highly skilled personnel were employed by higher education institutions which make them initiate contract research for industry and other organization to increase their funding.

The specialized knowledge sector consists of the institutes of aerospace, shipbuilding, instrumentation etc. industries. They concentrate on applied research in a particular field of science and technology. This form of institution was created in the Soviet period when each

branch ministry organized its own branch research institute that served the goals of the ministry rather than the enterprises of the same field.

The sector of state science centers is a relatively new form of organization of Russian science that includes major research institutes in the field of applied science. This sector gets priority budget funding from the government.

The sector of small science business specializes in innovative technologies that are usually based in big enterprises or inside research institutes. In the past it was the least developed sector the development of which is widely promoted now due to its closest connection to production and the funding from interested enterprises.

Besides higher education institutions the research in the Russian Federation is carried out by various types of organizations such as research institutes, mechanical bureaus, engineering organizations, experimental factories, industrial enterprises and other organizations. The main form of conducting research in Russia is still research institutes which in most cases are independent from universities and enterprises, and therefore, from the real sector of the economy.

This study focuses only on the university research sector of Russian science, that is research carried out by public universities, institutes and academies or by joint teams of scientists from universities, the Academy of sciences and enterprises at the premises of universities and in which university research take part.

The structural base of the university sector science is the departments with their specialized research laboratories. Departments are grouped into faculties that prepare specialists in a particular field. University departments are responsible for training, organization and conducting of research activities leading to preparation of postgraduate students seeking Candidate of Sciences and Doctoral degrees. Within some universities there are research institutes that are the parts of the related faculty or are under the administration of the higher education institution. So, the university departments or research institutes are the main form of development of scientific schools and strengthening of scientific potential of the higher education institution.

However, the major part of research activities is concentrated at the research institutes of the Russian Academy of Sciences. Research activities are carried out mostly by large universities while others concentrate on commercial teaching activities due to the significant decrease of government funding and support.

The university research sector is considered to be significantly important because it performs a crucial function of combining teaching and a flexible supply for the country's demands in new specialties, for example. At the Board meeting of the Ministry of Education and Science in May 2005 the following actions in developing research activities were defined (Ministry of Education and Science of the Russian Federation 2005). They are:

- Modernization of the system of researchers training and attestation;

The development of higher education requires continuous improvement of the quality of the personnel coming to the sphere of higher education. So according to the federal law "About education" (10.07.1992, N 3266-1) in order to extend the training of researchers and to guarantee the common requirements for awarding academic degrees in universities, research institutes and academies 2509 Academic Councils were established (Ministry of Education and Science 2006). At the moment there is a process going on aimed at optimizing of the Academic Councils to maintain the high quality of attestation. As a result in 2003 the Highest Attestation Commission of the Ministry of Education and Science of the Russian Federation ("Visshaya Attestatsionnaya Komissiya, VAK") stopped the activity of 11 Councils, 43 Councils got warnings and 10 Councils were transferred to the mode of single defense. This signifies the increase of the accountability of Academic Councils that leads to the improvement of the quality of training and attestation of researchers.

- Development of networks between universities and academic research centers and industry;

This is connected with the initiative of the government to increase the role of the university research sector making it an active member of the national innovation system. Under the conditions of the integration of research via joint research projects between universities, research institutes and enterprises it is possible to achieve optimization of funding and more

rational use of laboratory equipment. The creation of state science centers, as well as government funding of the projects where all these three parts participate are aimed at the implementation of the above mentioned goal by the government of the Russian Federation.

- Synchronization of activities aimed at the modernization of education, university science, integration of science and education under the federal targeted programs.

By this goal the government intends to guarantee equal attention to education and research during the conduction of various modernization activities that at the end will bring to their integration. Historically, the integration of education and research was the model of traditional Russian universities from the 18<sup>th</sup> to the beginning of the 20<sup>th</sup> century. Later, the conditions of planned economy, and the lack of resources led to the disconnection of education and research. However, after the last reorganization, with the creation of the joint Ministry of Education and Science the process of integration was initiated again.

The present regulative framework of science functioning in the Russian Federation is defined mainly by the federal law “About science and state science and technology policy” ratified 23.08.1996, N 127 that was changed the last time in December 2006. It defined the division of powers and cooperation on all levels of state authority for realizing a unified science and technology policy, the funding mechanism, accreditation of scientific organizations, structure and governance of the Russian Academy of Sciences etc. All other regulative documents and decrees are made on the basis of the federal law.

In 2004 the state science sector of the Russian Federation included 2760 organizations, of which 94% were in federal ownership and 6% in the ownership of the subjects of the Russian Federation. In 2004 the Ministry of Education and Science divided the Russian state science sector only in three sub sectors: academic, applied and university (Table 1) (Ministry of Education and Science of the Russian Federation 2005).

Sectors	The proportion of various sectors in		
	number of organizations	number of personnel involved in R&D	basic funding for R&D
Academic	29,5	22,6	24,3
Applied	51,4	70,9	63,4
<b>University</b>	<b>19,1</b>	<b>6,5</b>	<b>12,3</b>
Total	100%	100%	100%

*Table 1. Structure of the state science sector. Ministry of Education and Science of the Russian Federation 2005.*

Despite various initiatives by the government to strengthen the university research sector, it occupies the last position in 2004 among the other sectors. Therefore, the main effort of the government is to reorganize the university research sector and to improve the situation with the university research confirming its significant role in economic development of the country by integrating it with the resources and capabilities of other sectors as much as possible.

Characterizing the university research sector it is possible to note that according to the Ministry of Education and Science of the Russian Federation (2006) only 37.6 % of higher education institutions of the country have expenses for research and development activities (R&D), approximately 20 % of teaching staff is involved in research and 6.5 % of personnel. In the past one of the advantages of Russian science was its high qualified personnel. After the collapse of the Soviet Union when the restructuring of the science sector started under the conditions of shrinking of personnel, decreasing of funding that lead to a brain-drain and the gradual destruction of material and knowledge base of Russian science.

	1994	2003
Total	45	48
Doctor of Sciences	58	60
Candidate of Sciences	49	53

*Table 2. The average age of researchers in the university sector. Ministry of Education and Science of the Russian Federation 2006.*

From Table 2 it is clear that there is a process of aging of research staff due to the fact that there is a decrease in the number of young scientists coming to the university research or they leave science between 30-40 years. It is explained by the less paid research activities at the universities in comparison with teaching commercial students or in private institutions. Another reason might be too high a teaching workload that prevents researchers from conducting research activities and leads to meeting just the formal requirements in the number of participations in the conferences and publication of articles that is required for the renewal of the employment contract. The government has introduced some measures to improve this situation, however, they are very fragmented and are not aimed at solving problems but are very formal. For example, there is a number of governmental grants and scholarships for students, postgraduate students, young Candidates and Doctors of Sciences, but they are very few in comparison with the number of potential applicants and the amounts are not very high either. Also these changes are not oriented at improving the working conditions in terms of equipment, career opportunities, possibilities, involvement in contractual research agreements etc. that are considered important in the research sphere.

In general, it is possible to distinguish three periods in the development of the state science and technology policy in the Russian Federation. Firstly, after the collapse of the Soviet Union with the major document “The Doctrine of the development of Russian science” adopted by the President in June 1996. Then the next period was based on the “Conception of reformation of Russian Science for the period of 1998-2000” and finally all recent initiatives are done according to the “The basics of the policy of the Russian Federation in the field of science and technology for the period of up to 2010 and further perspective” that was ratified in March 2002 by the Federal Assembly. The analysis of these documents shows the changes in the relationships of the government towards the field of science and technology from seeing it as the national wealth that must be supported and the national resource of the development of the country to the highest priority status that is given major attention and support for its further development and strengthening with stable focus on basic research throughout the time.

The present state science and technology policy of the Russian Federation is based on the above mentioned document, as well as, on the other program documents, namely: the “Priority directions of the development of science, technology and technique of Russia for the period of up

2010” and the “List of strategic critical technologies in the Russian Federation”. The initiative of the integration of science and education is widely promoted and supported by the President, the Ministry of Education and Science as well as by the administration of leading universities. For this purpose the special federal program “Integration of science and higher education for the period of 2002-2006” was approved and later changed into a national priority project “Education” that covers all levels of education including the support for higher education institutions carrying out innovative activities, meaning various kinds of research cooperation between university, industry and research centers or branches of academies.

This period is characterized by the strengthening of Russian science and education in general through actively promoting integration of research and education by creating research universities and special status national universities and increasing the role of higher education institutions in the innovation system of the country. To understand how well these governmental initiatives are realized, it is important to analyze the funding mechanisms of university research and Russian science in general, as well as, the government’s policy towards funding of the university research sector in the Russian Federation.

## **3 FUNDING OF RESEARCH**

### **3.1 FUNDING PATTERNS OF UNIVERSITY RESEARCH**

Funding patterns of universities around the world differ. In contrast to funding for teaching that is becoming less specified, mostly given in the form of lump-sum funding, funding for research is more and more target-oriented. However, the largest share of money for research comes directly from the government sources, from the ministries or through some kind of intermediary organizations like research or funding councils. There is a tendency to introduce funding for more specified activities which is widely used in the USA, but rather a new phenomenon in Europe (OECD 2003). Only such countries as the Netherlands, the United Kingdom are more advanced in implementing earmarking of research funding.

According to OECD (2003) there are two basic forms of research funding in the public sector: institutional and project. Institutional funding is an annual block fund that is given to an institution and it has freedom to allocate it internally if there are no strings attached that happens as a rule in many cases. To make the allocation of funds more efficient some countries have introduced performance-based mechanism using peer review and research assessment exercises. Project funding differs from institutional funding by its competitive nature when institutions apply for grants to perform research for different donors. It includes such types as contract funding and funding through special programmes to promote excellence. Business funding for university R&D also belongs to contract-based funding pattern and its volume has increased significantly from 50% in 1980 to 69% in 2001 in OECD countries (aggregate trend) (OECD 2003, 68). The competitive funding mechanism is often attached to existing programmes or to new ones (centres of excellence) in order to include better socio-economic objectives into the research agendas and increase accountability for spending public funds (OECD 2003, 92). Such intermediary institutions as public funds and foundations are organized to distribute research funds. The idea is to create market conditions through competition for research funds by institutions. So market competition can be “simulated by distributing state subsidies through

competitive grants allocated by multiple research councils rather than by direct institutional support” (Teixera 2004, 334).

Aldo Geuna (2001) states that funds as a rule go through three different channels: incremental funding, formula funding and contractual funding. Incremental funding represents the mechanism of allocation of resources on the basis of past expenditure levels with some new incremental resources aimed at developing new activities. It is the most traditional funding pattern, widely used by all OECD countries until the early 1980s. Formula funding is based on the selective distribution of funds on the basis of research record. Contractual funding represents the most recent funding pattern that is based on competitive distribution of research funds via tenders, grants etc. to carry out specified tasks. In general, contract-base funding appears in two forms. The first is contracts with national, regional or local government to do a specific research project and the second one is contracts with private organizations obtained from the open market (OECD 2003). This type of research funding is widely spread in the USA and Australia and nowadays European governments make strong demand for higher education institutions to search for external funding by encouraging them to sell their services on the market. This relates to financing by the so-called “third parties”, such as industry and private foundations. In practice there is a mixture of these funding patterns with a more significant role for formula and contractual funding mechanisms which signifies the shift from block funding to more competitive contracted one.

For example, in the Netherlands public HEIs receive funding from three pillars (CPB / CHEPS 2001). Core funding flow represents the public contribution to research activity on the basis of social and scientific needs, the profile of an institution, the quality of research in the form of lump-sum funding with full freedom to relocate the funds between various activities. Core funding is the main source of funding of university research that comprises around 70% (CPB / CHEPS 2001, 18). It comprises of five parts: the component for basic research facility (fixed amount per university), the component for PhD and designer certificates (number multiply tariff group), the component for research centers (proportion to other components), the component for excellent research centers that is allocated by the Ministry after the consultation with Dutch Research Council and strategic consideration component that is a fixed amount per university aimed at supporting “strategic research” by the government. Therefore, the strategic research

component represents the highest amount of research funding. It means that “most of the funds for research are not distributed on the basis of output” (CPB / CHEPS 2001, 31). The second flow is project based public funding distributed by the Dutch research Council on a competitive basis for individual researchers or research teams. And the third flow of funds is contract research carried out for government and other organizations. From the 1998 budget on, there was an addition to the research funding model, namely extra support for establishing research schools and support for best research schools or those with high potential.

The example of output-based research funding model (based on RAE) is presented by the UK which has a dual support system. The idea of output-based research funding is that it stimulates the increase of the quantity, as well as, the quality of research output. Funding is given only to the most productive research groups that will lead to a raise of the overall research output. The Higher Education Funding Council for England and the Scottish Higher Education Funding Council in Scotland allocate the funding for research selectively by means of a performance-based mechanism, based on the so called Research Assessment Exercise, introduced since the end of the 1980s. This assessment exercise is conducted every four – five years, on the basis of which each institution is given a rating for its research quality in all departments participated. The funding is further given only to best performing units, making the situation when “funding for research is highly concentrated by institution and department” (OECD 2003, 66). The second flow of state funding is allocated by the Research Councils to carry out specific projects. These funds cover only the direct costs of project realization while indirect and infrastructure development costs are supported by the quality-related funding.

In the Russian Federation the proposition concerning the amount of Federal budget for science and research is developed by the Ministry of Education and Science on the basis of applications of other ministries and departments and is given directly to the recipients that have to prepare the estimate of expenses to the Ministry of Finance. The amount of money spent for federal contracted programs is decided by the cooperation of the Ministry of Education, Finance and Economic Development. Then the bill of the budget for the following fiscal year goes to the Parliament. After approval of the budget, its allocation to the recipients is controlled by the Ministry of Finance. Within this system the major regulators of the federal budget for science are the Ministry of Education and Science; the Russian Academy of Sciences (all branches); Moscow

State University; State Foundations such as the Russian Foundation for Basic Research, the Russian Foundation for Humanities, the Foundation for development of small enterprises in science and research; other ministries and departments like the Federal Agency for Science and Innovations. Ministries and Agencies distribute a large proportion of resources that are given to them under the Federal contracted programs, as well as, they develop and implement their own contracted programs.

The Ministry of Education and Science is responsible for the allocation of funds according to state priorities of science and technology. The Ministry finances the implementers of federal contracted programs, individual scientific schools on competitive basis and priority areas of science and technology. This procedure involves the transfer of funds from the Ministry to the Russian Academy of Science with its regional branches and Moscow State University. Then, Academies allocate the funds to the final recipients. However, Academies usually perform the whole research cycle from basic research to the implementation of the results, so they get all the finances themselves plus additional ones (Degina 2006).

In contrast to many other countries, in the Russian Federation there is the so called monopoly of the Russian Academy of Sciences that is an autonomic non-commercial organization with public status which in fact develops and implements the national policy in the field of basic science. However, as it is known, according to the charter of any non-public organization it acts first of all in the interests of its members and only afterwards in the interests of other stakeholders, in our case in the interest of the state and the general public. The Academy's main source of funding is the resources of the federal budget that are given to it according to the law about the federal budget of the Russian federation. It is the direct recipient and major regulator of the funding. Therefore, combining two functions of financing and doing scientific research, the Academy controls funding, accomplishment of projects and carries out the expertise of the results itself that is not in accordance with the democratic principles (Russian Academy of Sciences 2006).

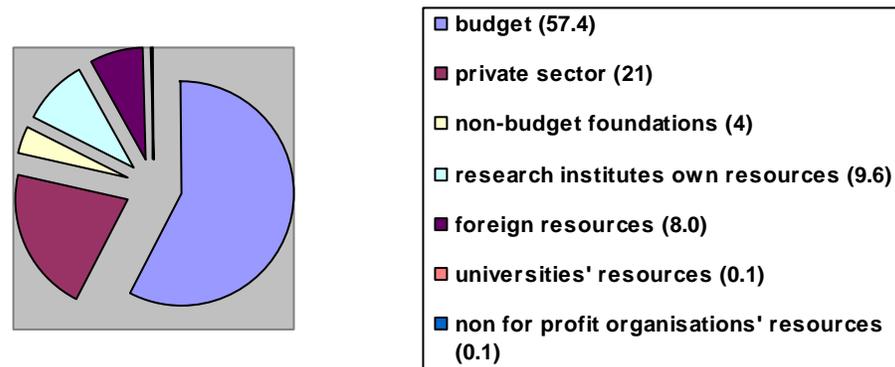
The financing of the university sector is executed from various sources. In contrast to previous Soviet tradition when universities were fully funded by the government, today instead of one guaranteed budget funding there are several inter-complementary sources: national, regional and local budgets, enterprises' investments, students' fees, foundations, own commercial activity

of higher education institutions (Morosova 2004). The structure of budget funding of the university research sector includes roughly three types: the system of common state order, grants and science programs. The funds received within the common state order are used for financing research institutes within higher education institutions. Their amount is relatively small and usually allocated internally on competitive base among research institutes. The major principle of basic budget funding for the university sector in the Russian Federation is based on an estimate of expenses of all science research projects conducted in a particular institution. The amount of money required is calculated by technical economic computation of each individual cost. The estimate of costs for functioning is prepared every year by each state higher education institution where the training process, personnel salary, equipment, utility bills payments etc. is included alongside with the scientific activity.

Higher education institutions in Russia do basic and applied research in all areas of science. However, the major part of research is carried out by autonomous scientific institutes that are detached from universities and business enterprises as it was during the Soviet times due to the isolated existence of the parts of national innovation system (universities, scientific institutes, enterprises, innovative infrastructure). So, the university sector comprises only about 10% and enterprises - 6.5% of all organizations doing basic and applied research in the country (Gohberg 2004, 108). The financing of research activities of HEIs proceeds from national, regional and local budgets and non-budgetary sources. The major part of research is financed by the state budget (70%) by an order from the Ministry of Education and Science, science and technology programs, grants of the Ministry of Education and Science, grants of the State Foundations and federal contracted programs. Other funding for research (30%) is generated through performing contracts for enterprises and organizations, realization of international projects, grants and contracts. Scientific activity is planned by an individual HEI. The control is carried out by the Ministry of Education and Science on the basis of the annual reports presented by the organizations within the deadlines (Morosova 2004). In the Federal law "About science and state science and technology policy" there was a norm to allocate not less than 4% of the federal budget to science during 8 years, however in fact it was around 2%. In March 2002 a decision was made to increase this number up to 4% in order to execute the law, however, another federal law N 122 from 22 August 2004 excluded the condition to allocate 4% to science (Smolin 2005, 18). In comparison with other G8 countries the amount of GDP in % spent on

research is the lowest, only 1.01 % in 2001 (Beketov 2002, 74). In 2002 its amount became a little higher – 1.24 % or 135004,5 million rubles where more than half is from budget and non-budget foundations. If calculating GDP per capita the Russian Federation stands practically behind all OECD countries (Federal State Statistics Service 2006).

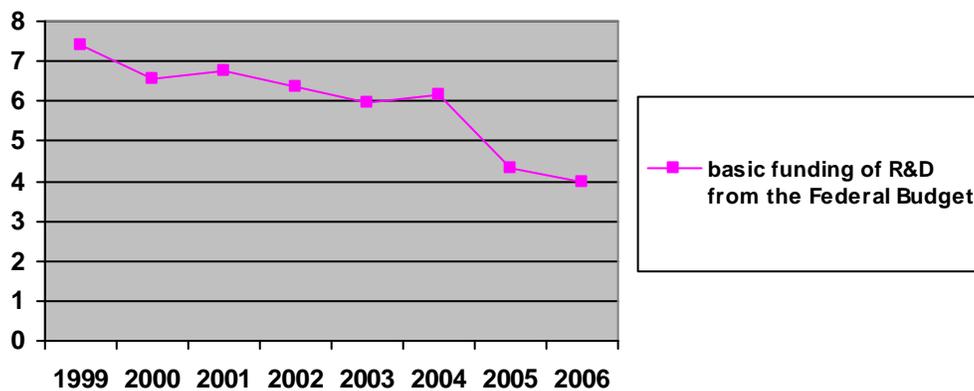
Figure 2 shows the structure of funding for research and development according to the sources of funding in 2002 in the Russian Federation. It is clear that there is a necessity to attract more funding from private sector. To do that the government has to pay more attention to the creation of favorable conditions that will make enterprises interested in cooperation with university research sector.



*Figure 2. Structure of expenses for research and development according to the sources of financing in 2002, in percentage. Federal State Statistics Service 2006.*

One of the forms of budget research funding in the Russian Federation is the research done within the confines of the thematic plans of the government. In contrast to grant form the government signs a contract with the whole organization, not an individual researcher, because a project funded this way requires huge investments. State order is a kind of thematic plan aimed at solving significant science problems.

The basic funding of the university research sector is the major source of funding since in the Soviet times and still nowadays. However, there is a tendency to gradually substitute basic funding for contracted and competitive funding patterns as shown in the Figure 3.



*Figure 3. Percentage of the basic funding of research and development in the total expenses for science from the federal budget. The Ministry of Education and Science of the Russian Federation 2007.*

Therefore, in general there are three levels of research funding in the university sector, namely basic (the fixed amount of money given to institution based on a traditional approach taking into account the size of an organization, number of scientific schools, research students, ranking of the university etc.), contracted (usually negotiated by the administration of the institutions with the Ministry on the basis of political and economic ties, personal relations and other mutual benefits) and competitive (a new developing pattern of resource allocation in the form of grants for the best qualified institution or research team) principles. The research funding allocation is controlled by the Ministry of Finance via financial audit, therefore, the level of implementation of technical programs, its level of completion, value of theoretical and applied results, its conformation to national priorities are left basically uncontrolled. So, is it not taken into account when the organization applies for the next program funding.

Contracted research is presented by federal contracted programs that are one of the instruments of the realization of priority goals of the government, as well as, a form of budget financing of science in the Russian Federation. These programs were very popular in the 1990s (up to 155 supported programs) as the first new forms of diversification in funds allocation. Due to the lack of governmental financial resources to support this big number of programs in 2005 the government financed only 33 integrated programs and in 2006 – 23 federal contracted programs (Degina 2006). The disadvantage of this mechanism is that the research area choice is

not connected with the private sector demand, and therefore, is not oriented at attracting investments from private sector and industries.

D. Livanov, Vice Minister of the Ministry of Education and Science of the Russian Federation, in his report about the development of the state science sector in 2005 indicated the main directions of the financial reform in the science sector in general. They include the expansion of the program-oriented approach and management by results in the field of science; optimization of the proportions between basic and program funding; increase in financial remuneration of researcher and scientists and an increase of the proportion of investments in budget funding. The initiative is to transfer from the system of multiple main managers and recipients of budget funding aimed primarily for basic research to a three-channel system, incorporating the Russian Academy of Sciences, higher education institutions and state science foundations. In the process the Academy's role as the coordinating and expert organization will be kept and even strengthened (Ministry of Education and Science of the Russian Federation 2006).

Within the issue of funding it is important to mention the funding of postgraduate schools in public higher education institutions which prepare the future researchers and scientists for the country. The government fully finances studying in postgraduate schools. Every year the Ministry of Education and Sciences gives the number of places for higher education institutions based on the results of the previous year in terms of the number of applicants, number of actual students and the rate of completion. It might provoke universities to take as much postgraduate students as possible without the guarantee of their successful completion of the thesis and therefore produce inefficient spending of federal money (Saveliev 2002). This is worsened by the fact that in order to get the state accreditation as a higher education institution there should be a minimum of five postgraduate schools and at least four postgraduate students for one hundred full time students (Ministry of Education and Science 2006).

	Total number of postgraduate students	The number of students who finished the postgraduate school without the defense of the thesis in 2003	The number of students who finished the postgraduate school with the defense of the thesis in 2003	The percentage of the completion with the defense of the thesis
<b>universities</b>	<b>121782</b>	<b>26463</b>	<b>7537</b>	<b>28.5</b>
Russian Academy of Sciences	8194	1937	225	11.5
others	10765	2399	616	25.7

*Table 3. Efficiency of postgraduate school in 2003. The Ministry of Education and Science of the Russian Federation 2004.*

Table 3 demonstrates that higher education institutions have the biggest number of postgraduate students among other types of institutions and in spite of the fact that the percentage of the efficiency is the highest as well, in general the rate of completion of the postgraduate school with the defense of the thesis in the Russian Federation is very low. This confirms the necessity to change the way of allocating places by the Ministry to HEIs in terms of decreasing or stopping financing the ones with low efficiency. This measure requires the cancellation of the requirement to have a postgraduate school in order to have state accreditation as a higher education institution. In the future this might allow increasing the budget funding for one postgraduate student and make the funding more result-oriented that in its turn will improve significantly the quality of research and developments in the country and stop graduate school from being just intermediary places before choosing the further career or the place to escape military service.

The first real practical change was made with the decree of the government of the Russian Federation from 22.05.2004 N 249 “About the measures to increase efficiency of budget expenditures” after which the change to the federal law “About the budget classification of the Russian Federation” (15.08.1996, N 115) was introduced. In 2005 it included higher education institutions as the recipients of budget funding for conducting basic research that means that the factual implementers are accounted. However, the sectoral division of financing has not

practically changed at all. About 40% is for the basic research conducted in the Russian Academy of Sciences and only 5,2% for universities (Degina 2006, 21).

In general the Ministry of Education and Science intends to implement the following actions aimed at the modernization of the university sector of Russian state science. First of all, the idea is to develop the system of middle and long-term funding for research based on basic part for the period of 3-5 years. It will be used for salaries of the personnel, equipment, development of the infrastructure, payment of utilities. The second part is the project part that will be the basis for selective support of competitive teams of researchers and individual scientists. Also it includes the improvement of the system of competitive selection of research programs and projects; increase of funding for basic research done under the thematic plans of universities; an advanced increase of research funding in leading universities; funding of projects of young researcher, teachers and postgraduate students and the synchronization of the government's activities aimed at the development and modernization of education, university science, integration of science and education under the confines of federal contracted programs.

### **3.2 COMPETITIVE BASED FUNDING IN THE RUSSIAN FEDERATION**

The conditions of decreased availability of government resources, changed regulatory framework and the market situation makes an increasing number of higher education systems address the competitive approach in funding higher education and science including university research in particular. Science is by its nature competitive presenting the competition among researcher for inventions and discoveries, therefore the introduction of competitive funding seems natural. However, the issue of the amount of basic and competitive funding is a topic for discussion in all countries. As A. Geuna notices “the competitive approach to university research funding is based on using financial incentives to control university research behavior indirectly” (1999). This means that the governments intend to increase research efficiency, quality that improves in its turn the accountability of higher education institutions conducting research and reduces the budget costs by this way.

A competitive approach for university research funding is implemented or in the process of implementation in many countries all over the world due to such advantages as the possibility to evaluate the quality of the research output correctly and to identify the most promising research avenues. Cost reductions are attained without decreasing the quality of the output and it allows concentration of scientific capabilities and state funding and there is a decrease of the administrative costs for both government and higher education institutions (Geuna 1999, 26).

The competitive approach to university research funding based on competitive allocation of funding in the forms of grants is very new in the Russian Federation and covers only a small part of the research activities, while the major part still gets basic government funding. Government competitive funding is based on the system of grants. There are three functioning state foundations that were created after 1991: Russian Foundation for Basic Research, Russian Foundation for Humanities Research that was initially its part, but later separated, and the Foundation for Assistance for Small Innovative Enterprises. The activity of these foundations might be characterized as non-departmental and researcher-oriented because in contrast to the past tradition of supporting organizations, the foundations support projects of individual researchers or teams of researchers. There is no limitation on the topics of research supported and they are initiated by the researcher themselves within the indicated fields of studies (Degina 2006).

If Russian Foundation for Basic Research and Russian Foundation of Humanities research offer non-refundable grants, the Foundation for Assistance for Small Innovative Enterprises works on the principle of refundable funding with indexation of the amount of the credit up to 0,5 rate of the Central Bank for the moment of the signing of the contract. The idea is that if a big amount of money has to be given back to the foundation, it selects more carefully the applicants, by studying business plans, and other document. The result is that 70% of funds are transferred back to the foundation.

However, these three foundations make up only a small percentage of the budget funds allocation that might mean that the government by taxation policy should stimulate commercial organization to create other foundations to have more competition.

The overall amount of investments into university research in the Russian Federation has increased more than 33 times in comparison to the 1990s, including 28 times for basic research, however, Russia takes one of the last positions in comparison to other developed countries, which only confirms the necessity of greater support and development of the university science sector.

Country	Budget investments for R&D	In GDP
<b>Russia</b>	<b>5,4</b>	<b>0,07</b>
UK	22,6	0,42
Spain	29,8	0,31
Canada	32,8	0,63
Korea	10,4	0,30
Norway	26,8	0,45
Portugal	35,6	0,33
USA	15,9	0,42
Finland	19,2	0,66

*Table 4. The density of university sector in terms of investments for research and development and GDP, percentage, in 2002. OECD, MSTI Database, May 2004*

This situation is explained by the peculiarity of the science sector structure in the Russian Federation where during a long time science was not considered the priority activity of higher education institutions and was rather conducted in separate research institutes, therefore the government allocated only a small part of federal budget for university research. With the understanding of the role of universities in research production and the importance of integration of different sectors of science as the only way for developing an innovation-based economy, the Russian government encourages active participation of higher education institutions in research by coordinating competitions, targeted programs and projects using the resources of the federal budget.

Individual researchers and teams play a significant role in attracting financial resources to the higher education institutions they work at. To get funding from governmental programs allocating the funding through competition and particularly from various private providers like enterprises and foundations a certain level of entrepreneurial talent is required of researchers and university administrators in combination with strong science and technology base.

State science foundations were initially an attempt of the scientific community to become self-governing (van Vught), however, in 2001 after the change of the legislation, these state

foundations have had a contradictory status. They were given the legal status of state organization and they actually became just one of the forms of budget resource allocation of the government. The good thing is that the underlying idea of expert analysis of applications for funding is still done by the scientific community. The foundations play an important role in developing science in the country by supporting research projects and initiating various programs based on competition such as the development of communication systems, scientific publishing, improving laboratory equipment, supporting young scientists and researchers, innovative projects. The competitions at regional level encouraged the regional and local authorities to fund partly the conducted research initiatives and programs.

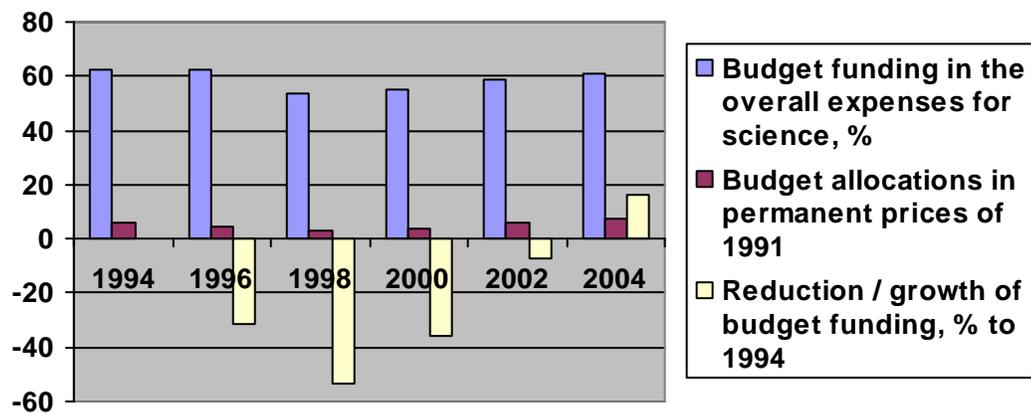


Figure 4. The dynamics of budget funding of Russian science. *Science in the Russian Federation. Statistical book 2005.*

According to the Figure 4, it is possible to see the stable tendency of the dependency of Russian science on federal budget money. The upper high columns show that it is quite stable from 62.3% in 1994 to 60.6 % in 2004. Therefore, it is a very important trend that the Russian government tries to keep and even increase the funding for science, but change the method of allocation through open competitions of programs and projects.

The government uses the competitive mechanism of allocation of federal budget for research through mostly federal contracted programs in order to make it result-oriented and more transparent and efficient. However, in practice the managerial principle, structure and substance have not changed since the usage of governmental orders in the Soviet times (Degina 2006). The

domination of the government as the main funder and the lack of other sources of funding create a situation of corruption and lobbying when each year the winners are primarily the same institutions. This makes the competition process just a formality when the winners are known well in advance. There are some attempts to change the situation by developing effective assessment criteria. The Ministry of Education and Science developed two objectives that allow assessing the efficiency of the usage of federal funding under the condition of the overall contribution to the formation of national research and development and the innovation system. They are creating favorable conditions for promoting innovative activities and for the development and implementation of the results of science and technology activities. However, these objectives describe mostly only the targeted process rather than the final result that has to be achieved, which makes it very difficult to assess the level of their fulfillment. Another aspect is that in the process of assessment only quantitative indices are used without qualitative ones, but it is known that quantitative indices have a much stronger influence and have to be combined with peer review in the process of assessing of research results. However, all these are technical disadvantages, the overcoming of which contributes to the convergence to the result-oriented competitive funding allocation mechanism that has proved its efficiency already in other higher education systems.

Competitive based approach of university research funding might be a very good tool facilitating the integration of science and education in the country with significant decrease of efficiency and funding provision of university research sector. It will allow finding out the potential of university science in terms of scientists and researchers conducting research and offering targeted financial support for them and the organizations they work at.

### **3.3 NEW EMERGING FORMS OF UNIVERSITY RESEARCH FUNDING**

University research activities are necessary nowadays to position the institution in the educational market. In the Russian context research is extremely important for institutions due to the reorganization of the science system where budget funding is supposed to be given to large research universities / centers. In this sense to be capable to apply for this kind of status, higher

education institution must have sufficient and well developed research infrastructure already. Therefore, the participation of non-governmental bodies in university research is considered as necessary.

In many European countries the principle of matching funding from the private sector is the criterion for a number of programs. Russian government tries to implement this principle as well through indicating conditions for receiving budget funding on competitive basis.

Significant financial support to Russian science, including university research, is generated at present from foreign foundations and programs. The first international science foundation “Open University Institute” in the Russian Federation was created by G. Soros. The other foundations supporting research and development are MacArthur Foundation, Fulbright programme, Carnegie, INTAS, TACIS, IREX, DAAD, Ford Foundation, TEMPUS, Copernicus, British Council etc. All these foreign foundations started working in the Russian Federation during the transition period offering a kind of emergency financial help for researchers and institutions with further change to the assistance of the commercialization of research results and contribution to the implementation of the initiatives of the Russian government.

First started with supporting scientific researches, they turned into programs aimed at developing scientific infrastructure. At the beginning, the Russian Federation did not participate in these initiatives at all, while during the last years, the position of the government has changed and led to equal cooperation when the Russian government financed a part of all these initiatives. This is done through collaborative activities with Russian state science foundations that now announce joint competitions, for example, the Russian Foundation for Basic Research and INTAS or with DAAD. The peculiarity of this system is that funding is transferred directly to the researchers and not to the university in most cases (Morosova 2006). However, in signing the employment contract the administration of the university indicates the participation in the application process for various funds as one of the conditions that will be used to evaluate the efficiency of the person after the completion of the contract period.

Russian universities participate in international programs and conduct joint research. Higher education institutions make scientific research for enterprises in the form of economic agreements. Higher education universities benefit from the foreign foundations by gaining

additional funding for libraries, research laboratories, training exchanges of the personnel, financing of joint research projects that help make the Russian university sector more attractive and prevent the “brain drain” tendency.

In 2002 the Russian government initiated the mechanism of co-financing of research activities with the public sector with the aim to support innovative projects of high importance for the country. These projects are carried out by the teams consisting of the representatives of science and industry. The underlying idea of the introduction of this mechanism is the possibility of the government by this way to support big innovative projects by taking the technological risks upon it in order to create conditions for development high technology business. This initiative was started by the Ministry of Industry, technique and technology of the Russian Federation, however after the liquidation of this ministry the implemented projects were divided between two ministries: the Ministry of Education and Science and the Ministry of Industry and Energy, which influenced negatively the whole idea. Budget funding was given in this case to higher education institutions that are the partners of industrial enterprises, with the condition of increasing investments five times after the commercialization of the products. The actual result was only two times only for a few numbers of the projects. The commercialization of the results in this partnership must be carried out by the enterprise, which leads to the difficulty of negotiating between university and enterprise about what kinds of research and development activities must be conducted. Many innovative enterprises in Russia still consider as an additional risk factor to cooperate with state scientific institutions, mainly because of the lack of support by the government of innovative activities of enterprises (Degina 2006, 78). The other reason is that for the realization of a mega-project by a university and an enterprise, the government gives money to the university while the commercialization of the results has to be made by the enterprise. In this scheme it is very difficult for both partners to agree on the interests and opportunities and about the research activities that are to be conducted.

Research institutes apply for funding from domestic, as well as, international industrial enterprises to perform research. This is in many cases refer to short term research that is further commercialized by these enterprises. However, the cooperation between higher education institutions and industry / private sector is considered very important due to its crucial role in

contributing to the innovation system, the creation of which is the priority for the government of the Russian Federation.

## **4. INNOVATION SYSTEM**

### **4.1 INNOVATION SYSTEM OF THE RUSSIAN FEDERATION**

The innovation system of a country represents the interaction between the actors involved in innovation. It includes producing, distributing and applying knowledge. The actors of an innovation system are enterprises, universities and public research organizations and people who work in them. They collaborate among each other through joint research, exchange of personnel, cross-patenting, purchase of equipment and a variety of other channels (OECD 1997, 9-10).

In the Russian Federation the government started paying more attention to the science, technology and innovation spheres just recently around 2005. It was done mainly by co-financing of infrastructure formations like science parks, incubator, innovative centers, as well as, by venture and non-budgetary funds that will contribute to the creation of a national innovation system.

In September 2006 there was established the State Commission for the development of industry and technologies which is responsible for coordinating activities of various authority bodies concerning the realization of state policy to increase the rate of economic development, diversification of the industry structure, increasing of the competitiveness of Russian production etc. It means that the government intends to change the structure of Russian economy, making high technology industries the base of the economic development. This Commission is the main actor regulating all activities in the field of science and innovations of the country presented by the Ministry of Education and Science, Ministry of Economic Development and Trade and Ministry of Information Technologies and Communication. The Russian Academy of Sciences plays a significant role in this process coordinating fundamental research in different fields of study together with the state foundations that finance the most perspective research initiatives.

The Ministry of Economic Development and Trade focuses on the support of innovative projects aimed at the implementation of research results. To intensify the innovative capacity of Russia there is a plan to create ten special economic zones with particular specialization in each.

There are already four zones: Dubna (nuclear technologies), Zelenograd (microelectronics), St. Petersburg (information technologies), Tomsk (new materials). The idea is to offer government support for the enterprises working in these zones in terms of tax reductions and customs simplifications.

In 2005, the Investment Fund of the Russian Federation was created to support the realization of investment projects. The government transfers all extra revenues of the Federal Budget of the country, which was 72 million rubles in 2006, and is planned to be 200 billion rubles in 2007 (Aterekova, Zgurov 2006). This Fund established the first ‘Russian Venture Company’ with the plan to create twelve other regional venture funds.

All these initiatives of the government are intended to create a venture industry in Russia in order to realize innovative projects attracting private capital. The Federal Agency for science and innovations current initiative is the organization of science centers all over the country as the instrument for developing strategic fields of science. According to the Federal Law “About the status of science centre of the Russian Federation” (7.04.1999, N 70), it is a municipal establishment with the status of a region characterized by strong scientific and technical potential with the town’s science-production complex. An example of such a science centre is Tomsk, which even in the 19<sup>th</sup> century was already the scientific centre of Russia with the first university in Siberia and Far East established in 1878 and other five universities, more than 80 thousand students, more than 700 Doctors of Sciences, 23 Members of the Russian Academy of Sciences, 4000 Candidates of Sciences and 1500 postgraduate students.

The official document “Basics of state innovative policy of the Russian Federation up to 2010” indicates clearly the objective to transfer science-industry potential of the country into an innovative direction of development, to build the economy based on knowledge, i.e. the development of the innovative component of the economy. According to this government document, the creation of a national innovation system is the priority of the Russian state policy. Russia possesses a great potential in a number of fields of fundamental science, however there is a lack of necessary conditions for its extended reproduction. In the Russian Federation there is a problem of breaking of the innovative cycle at the stage of conversion from the fundamental research through research programs to commercial technologies due to low level of development of the applied development sector and the immaturity of the system of commercialization of

technologies. The main problems of the innovation system development in the Russian Federation are indicated in the document “The basics of the policy of the Russian Federation in the field of science and technology for the period of up to 2010 and further perspective” in the section that defines the objectives. The objectives are to develop and to start realization of a long-term strategy of development of innovations, to guarantee the functioning of the system of the institutes of development and venture funds, to improve the funding mechanisms of innovative activities, to focus on strategic directions of fundamental and applied research in the form of accumulation of budget funding, to strengthen the relationship of education with economy via integrated scientific educational structures.

#### **4.2 RUSSIAN UNIVERSITIES’ ROLE IN THE INNOVATION SYSTEM**

Universities have responded differently to the challenges of knowledge and technology transfer. The process of commercialization of research is very important for higher education institutions as it generates funding for further research or for other long-term research or research in less commercial fields of study. It is possible to observe the creation of various new departments and positions in universities in Russia and all over Europe and other countries, the major function of which is the promotion of the commercialization of research results and the protection of legal and financial interests of universities and researchers. For example, at Tomsk Polytechnic University (<http://www.tpu.ru>), one of the public higher education institutions that implements innovative programs and projects, a complete system of innovation cycle and innovative environment is created. There is an innovative technological centre that is responsible for managing all innovative projects of the university, including the process of commercialization of research results, technological incubator that finishes the innovative chain from research to the mass production at university enterprises. This is joined by a student business incubator that involves students in the process of commercialization of research and innovative activities of the university.

The Ministry of Education and Science under the process of realizing of the mega national project ‘Education’ intends to support within several years 30 innovative universities which contribute to the needs of the regional economy. The budget for this project is 5 billion rubles in 2006 and 15 billion rubles in 2007 (Ministry of Education and Science). This increases the quality of education, scientific and innovative activities, and its commercialization. The idea in supporting these institutions is that they not only prepare the specialists of the new generation for intellectual labor, but also become the members of the market economy as developers, providers of intellectual property, production and services of new quality that are in high demand in the market. Therefore, innovative universities are considered one of the elements of the innovation system of the country.

Higher education institutions contribute to the formation of the innovation system by participating in the innovative mega-projects co-financed by the Ministry of Education and Science as one of the members alongside with research institutes and enterprises. The state finances the creation of the technology transfer offices in the public higher education institutions to facilitate the process of commercialization of intellectual products of universities. However, the Ministry’s goal is to create a certain number of these offices, and as it is not responsible for controlling the efficiency of their functioning, it results in an inefficient way of spending federal money (Kortov 2004).

In this sense higher education institutions conducting research play a considerable role in the development of the innovation system of the country through their strong contribution to regional innovation systems by reproducing science and technology potential, self-production of services and products, generation of small business enterprises related to universities, preparing personnel for innovative activities, forming an innovative culture in the business environment (Kortov 2004). Innovative activity for Russian universities is a new phenomenon as they were not oriented earlier to get systematic financing for their innovative activity. Traditionally in Russia innovative activity is considered as a part of applied sciences and only some institutions now distinguish separately the innovative component of their activities. However, the result of universities’ innovative activities in the form of products or technologies might bring to them constant revenues in the form of selling production and services, commercialization of intellectual property objects, attracting venture companies etc. Therefore, innovative universities

are the basis for developing an innovation system of the region that in its turn contributes to the development of national innovative system that explains the initiative of the Ministry of Education and Science to find out and support innovative universities. Universities with this government assistance can become the innovative link that joins education, science and production in regions that contribute to the development of the country as a whole.

In general, it is possible to say that in spite of the various programs and documents connected with the creation of a national innovation system in the country, the Russian government's major weak point is that it does not pay a lot of attention to creating favorable conditions for enterprises wishing to make innovative activities in terms of tax reductions for example. This keeps industry and research far from each other and slows down the innovative activities as a result.

## **5. CHANGING CONDITIONS OF THE UNIVERSITY RESEARCH SECTOR**

### **5.1 CHARACTERISTICS OF THE NORMATIVE BASE OF THE UNIVERSITY RESEARCH SECTOR**

Higher education institutions in the Russian Federation work according to the system of normative-legislative documents. The basic documents in the field of science are: the “Constitutions of the Russian Federation”, “Civil Code of the Russian Federation”, “Budget Code of the Russian Federation”, federal law of the Russian Federation “About science and science and technology policy” (23.08.1996, N 127), the “Basics of the Policy of the Russian Federation in the field of science and technology for the period of up to 2010 and further perspective”, the federal law “About education” (10.07.1992, N 3266-1), the “Strategy of the development of science and innovations in the Russian Federation for the period of up to 2015”, the federal law “About the budget classification in the Russian Federation” (15.08.1996, N 115), and the “Doctrine about the development of Russian science” and other related documents and the numerous additions to these basic ones. The existence of this normative-legislative base is an important element, however, the analysis of their content shows some gaps and contradictions between them that slow down the development and decrease the efficiency of the initiative programs and projects introduced by the government in order to improve the science potential of the country where university sector plays a significant role. The analysis of the normative base of university research sector is of utmost importance in order to present the non-conformity between the way the university research sector has to function and how it is functions in reality, as well as, numerous contradictions of various legislative documents and other official documents regulating the sphere of research in the Russian Federation that prevent its more efficient performance and development.

The first thing is that the government’s role in the science sector steering of the country is not clearly indicated. According to the “Constitution” (article 114) the government of the Russian Federation is responsible for steering nationwide state policy in the field of science, while the

article 17 of the Federal Law “About the government of the Russian Federation” (19.06.2004, N 4) gives it only the right to develop and take measures oriented towards supporting development (Voronin 2006).

New “Civil Code” (1995) made it impossible for higher education institutions to be registered as science organizations, however, scientific activity is the major one for many leading universities, because the part of education, the main activity, is very big. This does not allow universities to participate fully in the development of the economy of the country. This is also problematic in the light of the government project of integration of education and science, the idea of which is the integration of universities with research institutes and enterprises to conduct joint research. The research institutes must have the right to be a legal entity within universities to conduct research activities. The enterprises that were established by universities became autonomous and enter the market separately using intellectual and material properties of the university.

According to the federal law “About Science and State science and technology policy” (23.08.1996, N 127), only accredited science entities can get tax reductions and the right to get defense orders. Without accreditation, an organization can do research but is not eligible for these benefits. Universities in this case are in a disadvantageous position in comparison with other research institutes and academies, which get science accreditation because they do not do, or do very little education. This rule was omitted by the additions to the Federal Law and now resulted in the situation when anybody can claim to be a scientific organization doing research and development and the government cannot control the quality.

The state budget funding is strictly fixed and the university can not transfer money to the research institutes that have a legal status but are connected to the university which leaves them without any basis budget funding. So there is a necessity of allowing universities to include other legal entities into their structure or transfer all research institutes into separated structures from the universities.

The introduction of new “Budget Code of the Russian Federation” complicated the flexibility of university activities by restricting financial independence. It prohibited having individual bank accounts for structural departments of the university. So, all revenues from out-

budget activities of the departments have to be in one account in the Federal Treasury. This makes it easier for the Treasury to exercise control over over-budget spending of budget organizations in the country. The university departments without their own bank accounts have no right to conduct independent financial activities which might be done through the central university body, which restricts significantly the dynamics of their financial activeness. University departments conducting research as the subjects of the market without their own bank accounts, balance, and the right to decide financial, material and personnel issues lose a part of revenues due to decreased efficiency of the structures.

In the Federal budget, the money for science is included in the section “Nationwide issues” where the allocations for fundamental research to all main recipients of the Federal budget are indicated. However, they are not structured into academic or university sector which is not in line with the objective of the government to strengthen the role of universities in research system of the Russian Federation. The positive aspect is that the expenses for applied research are separated.

The Federal law “About science and science and technology policy” (23.08.1996, N 127) defines the role of the government and the level of autonomy of higher education institutions in field of science. According to article 3, universities have the freedom to choose the directions of research and methods of conducting research and innovations. However, at the same time the government finances only research done within the list of national priorities and even other programs where the government is only a cofounder are oriented for supporting national priorities in research and development. It is understandable because the country is not able to support all fields of science and technology, but to leave the opportunity for new sudden progress in some area is very important as science is always characterized by the element of indefiniteness.

In article 4 it is indicated that one of the rights of a scientist or researcher is the right to have copyright of research results and apply for patents and other results of intellectual property and further get profit from them. But the patent legislation does not define clearly the rights for the results of research and development done at higher education institutions, using its equipment, buildings, accumulated knowledge etc. Article 7 states that steering of science and technology activities in the Russian Federation is carried out on the principle of the combination of state regulation and self-governing. The self-governing of higher education institution is

realized through the right to develop and confirm their science plans of institutional development according to the state tasks, the specialization of institutions and economic and scientific interests. The government in its turn develops priorities of science and technology development, guarantees the formation of the system of scientific organizations, develops and implements science and technology programs and projects, carries out the development of various forms of integration between science and industry, approves the charters of institutions, controls the efficiency of the usage of buildings and other properties.

In spite of the declaration of the necessity to increase the role of university research sector in the country, in the federal law, in article 11 the goal to strengthen science and education is listed as the last one. There is an indication of the usage of various forms of public discussions in the process of choosing priority areas of science and technology, as well as, conducting expertise of science and technology programs and projects, realized on competitive basis. This principle of open publicity is not realized at the moment.

The “Basics of the policy of the Russian Federation in the field of science and technology for the period of up to 2010 and further perspective” proclaims clear orientation towards innovation policy. The development of science and technology is one of the top national priorities. It explains the activities aimed at the development of fundamental science, improvement of state regulation in the field of science and technology, creation of national innovation system, increase of the efficiency of using results of science and technology activities, integration of science and education etc. However, in most sections of the document the role of the university research sector and the integration of science and education are not considered to the full. Also there is no clear indication of the legal status and benefits of new integrated science and education structures, universities and interuniversity complexes, as well as, the legal basis of joint use of scientific, laboratory equipment in teaching and research processes.

“The Strategy of the development of science and innovations in the Russian Federation for the period of up to 2015” is developed on the basis of the “Basics of the policy of the Russian Federation in the field of science and technology”. It is oriented towards stable increase of domestic expenses for research and development up to 2% GDP in 2010 and 2.5% in 2015. The funding is based on the state federal and regional budgets and only a small proportion from other non budget sources. The main goals are to strengthen the image of Russian science, increase the

supply of young researchers, development of balanced, sustainable developing sector of research and development. Within the strategy there is an indication of state support of state targeted programs and projects, state foundations with special attention to creation of large science centers. The priority for support is fundamental science as the basis for the development of the innovation economy of the country under the confines of the list of state priority areas. All other areas and problems will be solved by themselves according to the market forces.

In general the strategy is characterized by its pragmatism in assessing the available resources and instruments without bureaucratic slogans that might mean that the state policy in the field of science and technology is becoming more coherent and clearer for the public, as well as, for all parties concerned.

## **5.2 REASONS TO CHANGE UNIVERSITY RESEARCH SECTOR STEERING**

The university research sector still occupies a relatively low part in state science system of the country with only 12,2% against 33,2% of academic and 56,4% of applies sectors. The investments into research continue to grow steadily, however only 40% of public higher education institutions conduct research.

There is an inequality in the distribution of universities all over the country, as well as, the distribution of research personnel and funding. The concentration is noticed in the capital and mainly central part of Russia, and some regional centers. This situation is becoming even worse with the introduction of the government national project “Education” to create mega universities with federal status. It is done regionally through merging several public higher education institutions and academies or research institutes into one mega university. The status of a mega university gives more commercial and educational freedom, tax reductions, the right to establish branch enterprises and organizations for innovative projects. There are already three mega universities: Siberian Federal University in Krasnoyarsk, South Federal University in Rostov-on-Don. The next should be Far Eastern Federal University, and convergence of Moscow State University and St. Petersburg State University into Federal universities as well. These new

universities will have extra budget support in order to function like integrated complexes of education, science and business, centers of innovative technological development and preparation of high qualified specialists for the new knowledge economy.

The laboratory equipment in public universities is more than 11 years old that is not appropriate to develop high tech research. The low salary of research personnel, around 250\$ in 2004, makes them go abroad where the salary is a minimum of four times higher.

The separation of different sub-sectors of the state science sector complicates the integration of science into education and business, which results in lowering of the quality of preparation of university specialists, the incompatibility of university research and developments with the ones that are demanded in the market and might be commercialized with the help of enterprises.

Higher education institutions conduct research without having particular specialization that leads to the situation of multi-topics and parallelism of research. It is a characteristics feature not only on the institutional level, but also inside institutions among departments, research laboratories. There is very little or no collaboration among researchers and research teams on similar research areas.

There is an insufficient level of commercialization of intellectual property, created in higher education institutions, due to the lack of sufficient legislative base that decreases significantly the opportunities of universities to participate in innovative development of the economy and get a stable additional source of funding that might be used for further research and development activities.

The budget funding of university research is the dominant one while indirect government support for the university research sector through tax stimulus and exemptions is not well developed in the Russian Federation. The inefficiency of secondary state support might be explained by mis-coordination of different types of legislation. Various tax exemptions for scientific organizations that were used in the reform period from the Soviet system functioned mainly as the means to survive in the crisis situation rather than to attract more investments and stimulate scientific development. Nowadays more and more exemptions are abolished that do not

attract and stimulate universities to organize non-commercial enterprises and be an active member of the innovation system.

The government as the main financier exercises strong control over financial resources of higher education institutions, as well as, determines individually the state national policy of the country. The state national policy is based on the priority areas of the development of science and technology and critical technologies which are developed by the State Commission for science and technology policy of the Russian Federation headed by the Chair of the Government. The Commission consists of the high position representatives of the ministries. Within the last decade they were changed twice: in 1996 and the last time in May 2006, however without any prior public discussions, competitions etc. All further initiatives are developed within these priorities which confirms the lack of transparency of the decision making process and the general indefinite character of the priority areas that make other bodies and institutions clarify them by developing their own priority which altogether lead to misunderstandings and chaotic science policy. The control over financial budget resources is exercised by the Accounts Chamber (“Schetnaya Palata”) of the Russian Federation. It is a only a financial audit to check the correctness of the targeted spending of resources, adherence to the procedures of allocation of funds and preparing financial accounting documentation. It does not include any technical audit to find out the efficiency of the financed projects and programs and their contribution to the development of the economy.

Another peculiarity is the short-term financial planning of research activities due to the fact that each year a higher education institution prepares a request for budget funds. So, the funding of a project finishes with the financial year rather than with the completion of successful research and development.

### **5.3 INITIATIVES AND STRENGTHS OF THE RUSSIAN UNIVERSITY RESEARCH SECTOR**

After adopting the national science policy “The Basics of the policy of the Russian Federation in the field of development of science and technology for the period of up to 2010 and further perspective” the country started its way towards the development of the economy based on research and developments in which the development of science and technology is one of the top priorities of the country.

The national projects of creating federal universities and supporting existing innovative ones are aimed at improving and revitalizing the university research sector. After 2002, a record number of normative documents and acts to support young researchers and postgraduate students, innovative higher education institutions that contribute to the realization of national science policy of the country were adopted.

The main direction of the development of the university sector is increasing its role through the process of integration with science. The government is carrying out the reorganization of the financial support system by increasing the targeted support. If in the past all higher education institutions conducting research could get sufficient amount of budget funding according to their thematic plans, at the present day the percentage of basic funding is decreasing. The government increases the targeted competitive support of innovative projects of universities and prospective research areas that contribute to the economic development of the country.

The Ministry of Education and Science coordinates the priority national project “Education” aimed at supporting innovative universities, young researchers, creating national (federal) universities and business schools. The Federal Agency for Science and Innovations coordinates the competition within Federal targeted programs, i.e. research conducted according to the priority areas of the development of science and technology complex of the Russian Federation. Russian Federation still possesses a strong research potential in a number of fields such as physics, biology, chemistry, engineering, so the idea is to develop several science and technology centers, representing the combination of science, education and business that will strengthen their potential and offer attractive conditions for researcher and business representatives for conducting research.

An important element is that state targeted support is oriented not only at institutions or centers, but also at individual researchers and scientists through individual grants. The

government declares the significant increase of salaries for researcher and scholarships for postgraduate students, invests in the initiated programs, in the renovation of equipment, developing communication technologies, i.e. a research infrastructure according to modern European requirements.

#### **5.4 POTENTIAL OF THE UNIVERSITY RESEARCH SECTOR IN THE RUSSIAN FEDERATION**

Based on the current situation of the university research sector in Russia and bearing in mind some potential threats such as the further decrease of budget funding, long process of legal status reorganization of higher education institutions, conflicts of interests between universities, research institutions and enterprises, decreased research cooperation of the business sector and universities, decreasing number of young people coming into university research or decrease of the demand of universities' research and development results on the market it is possible to continue the started by the government the process of revitalizing the Russian university research sector.

The gradual change of the culture of steering from strict control to more coordination and real autonomy of higher education institutions might facilitate the achievement of all planned objectives of the development of the innovation economy of the Russian Federation. This requires more focus on monitoring the tendencies, determining the weak and strong aspects, stimulating initiatives of institutions that contribute to achieving nationwide goals rather than direct control of execution of administrative order by the higher education institutions. In this sense the delegation of responsibilities by the Ministry of Education and Science to non-governmental organizations such as professional associations might be beneficial because it will free the Ministry from huge amount of routines and allow more time for strategic steering.

The integration of science and education that already started by the government through various state programs and projects is the way to use more efficiently the scarce budget resources through joint use of equipment, knowledge and conducting researches. This will in its turn

increase the quality of higher education because graduates require research and entrepreneurial skills and abilities to be successful in the labor market and further to contribute to the economy that is based on high technology. The Humboldtian idea of integration of education and research is not new for Russia. Even three hundred years ago the Russian Academy of Sciences was established according to this principle as originally its function was not only to conduct research, but also to teach. The present initiative of integration is conditioned by the transition of the country to the market economy that caused similar problems for education and research. It is very important to remember that for the effective economy of the country education and research can not be separated. Science and research enrich education with new knowledge, develop new, more efficient teaching methods, while education is the source that supplies science with young researchers. Therefore, the solution of many problems of the development of research and education activities depend significantly on their effective integration. In the Russian Federation education and science were separate formally during the Soviet Era at the national governmental level, however, in real practice there were various kinds of connections and collaboration all the time through conferences, training periods, joint commercial activities etc. Therefore, the intensification of the integrated nature of education and research could significantly improve higher education system and the research of the country.

The development of a legislative base, as well as, favorable taxation policy in the field of research and development will stimulate the formation of alliances between higher education institutions, research institutes and business enterprises that will foster the development of education and science and innovative activity of enterprises.

The attractiveness of the Russian university research sector increases through the reorganization of funding mechanism by expanding the targeted funding and funding based on results, optimization of the correlation between basic and program funding, increase of the financial remuneration of researchers and scientists, as well as, the increase of the investments in research and development in budget funding. The given autonomy of higher education institutions, including financial and legal, allows increasing the process of commercialization of research results and acquiring by them a new sustainable source of funding.

A well-developed innovation system of the country with the active participation of higher education institutions will increase the demand of the results of research and development of Russian institutions and companies on domestic and also international markets.

## 6. CONCLUSIONS AND DISCUSSION

The main aim of this study was to find out what funding patterns are used to support the current steering approach towards the university research in the Russian Federation. This was done through the analysis of the benefits and advantages of the current steering approach of the university research sector, existing research funding patterns, and the legal, economic and political context of the Russian university research sector. The main conclusion of the analysis might be formulated as follows. The Russian government started a gradual change towards a more market oriented steering approach of the university research sector from the state sovereign model that will allow more autonomy and cultivate the self-regulation in the future. The introduction of competitive based mechanism of allocation of budget funding is used to support this change, however, it is required to increase its amount, the number of state foundations and the investment of business sector into the university research, as well as, the introduction of results-based control of the efficiency of funded initiatives to make it more solid and efficient. In this respect, some other improvements are also required like the urgent change of intellectual property legislation, clarification of the status of research institutes attached to universities, giving more financial autonomy to universities in deciding how to use research money based on some kind of agreement with the government about the way to control their level of efficiency.

The analysis show that during the last ten-twelve years the relationship between the government and public higher education institutions in the Russian Federation has not changed dramatically, that is especially true in the field of science. The steering of the university research sector presents an example of a sovereign state model with strong governmental control, hierarchical relationships between the Ministry of Education and Science and higher education institutions. The steering is centralized in the hands of the Ministry of Education and Science and respective Federal Agencies and is uniform all over the country.

The acceptance of a new package of documents regulating the field of science and technology since the beginning of the 2002, indicates the change of the state science policy and its direction towards the supermarket model by using new budget allocation system based on the

elements of market-coordination and competition, as well as, orientation to developing innovation economy in Russia. However, the change is very slow and the current steering approach consists of the mixture of the elements of the sovereign steering models with the respect to control of universities' research activities and allocation of budget funding, the institutional steering models in terms of the right of higher education institutions to develop research plans and choose themselves the research areas and methods of conducting research. The supermarket steering approach is come out as a result of the introduction of competitive-based funding allocation for research where the main criteria for assessment are efficiency, economy, flexibility and survival (Gornitzka & Maassen 2000). There is a formal degree of autonomy for public universities conducting research and all attempts of increasing self-governing potential stopped by the high level of dependency on government funding due to the low level of the development of the innovation system of the country.

One of the most important factors of the efficient functioning of the field of science and technology is the amount and the structure of financing where the governmental support through budget funding plays a significant role. The objectives and the overall direction of the national science policy are based on the strategic priorities chosen by the government that determine the way of budget allocation.

Market economy creates a competitive environment stimulating innovative activity of enterprises, higher education institutions and other organizations under the condition of the strong assistance of the government in terms of playing the coordinating and organizing roles. Government posses powerful legal and economic means of influence, so when implementing them it can either stimulate or decrease innovative development via taxation, custom legislation etc. Within the developed innovation systems in the market economy, the product of innovative activity are sold and purchased and therefore, they generate the profit which is distributed among all members of the innovative activity. The field became less dependent from the government due to acquiring other source of permanent funding. The government's role in this process is mainly to coordinate and organize the well-functioning of the science system through financing and co-financing programs and projects according to its own goals and objectives.

The field of science in general and university research sector in particularly are too complicated and huge to be controlled centrally as it is becoming more and more difficult to

manage efficiently. For this reason, more elements of the self-regulation model (van Vught 1994) instead of the self-control model have to be implemented. It would allow more decentralization and it would be easier to take into account local characteristics. This is important because higher education institutions are spread all over the big country where each region has its own specialization in industry and engineering, so a more flexible approach might encourage better the development of the innovation system in the regions and therefore the national innovation system of the Russian Federation.

Strict control over the university research sector is reasonable because all public higher education institutions' property belongs to the government as well as the major funding of research activities done at universities comes from the government. The problem is in the focus on the economic efficiency rather than results. For example, financial audits control the proper use of money according to the purpose they were aimed for, but there is no control was it worth funding this or that research initiative at all. By organizing various competitions for budget funding the government tries to support really efficient research universities, individual researchers and teams of researchers, however, even in this case the funding is based on the duration of the project, not on the significance of its results. It might be more reasonable to make the preliminary efficiency audits in the middle of the realization of the program or project and after the analysis of the efficiency of its results to make the decision about the further support and its amount. This will give a chance for researchers with less equipped laboratories but who really contribute a lot to the science and the economic development of the country to continue research.

The analysis of the role of the government during the last seven years and the resulting relationships between higher education institution and the government confirm the following tendencies in the university research sector of the Russian Federation. The government performs a strong role as the main legislator which regulates the legal basics of the science field, as the major financer of research and development and at the same time the main consumer of the R&D results, as the coordinator of the national science potential and conditions through introducing the most appropriate funding patterns, developing research priorities, goals and objectives, forms of cooperation of science, education and business and encouraging innovative activity. It also is the main political force determining the direction of the development of Russian science and uses the university research sector to meet its own interests. At the same time university research sector in

Russia witnesses the most active period in its development directed by the reorganization of the funding mechanisms. The introduced competitive based funding allocation method has already proved its efficiency by allowing the government to support the most productive and perspective higher education institutions and researchers. The government finances mega projects only if they are carried out by teams of representatives from universities, research institutes and enterprises which stimulates the process of integration of education and research and results in increased quality, efficiency and opportunity to gain additional permanent source of funding of university research sector due to the commercialization of results of research and development activities.

In general, the present state science policy of the Russian Federation is characterized by much more effort towards the revitalization of Russian science and university research sector in particular. The immediate results in terms of increase of the number of government funded programs and projects based on the collaboration between science, education and industry, greater support of university research centers, innovative universities trying to integrate science and education with business in order to be the active members of the innovation system, increase support of individual university researchers, more initiatives for the rational use of science and research equipment and laboratories, its improvement etc. proves its right direction. There are, as it was indicated in the previous chapter, benefits as well as mistakes, but it is the only way forward. It is possible to facilitate this process with the help of wider public participation in the discussions of the presence and the future of the Russian university research sector and the state science sector in general, more scrupulous analysis and approach towards the legislation that regulates the sphere of science and technology and all the issues attached to it, active participation of the scientists, university researchers, external experts in the process of defining strategic research priorities of the country.

This study revealed the current situation with the university research sector and the state science sector in general in the Russian Federation. To understand deeply what actions must be taken at national level to improve the relationship between the government and higher education institutions conducting research, it is necessary to do further investigation with the focus on the institutional level. The analysis of the research policy of individual universities, how it is created and what external and internal factors influence the research efficiency of the university might be the topics for further studies in the field of university research steering in the Russian Federation.

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